VOLUME XXI NUMBER TWELVE

THE NATIONAL GEOGRAPHIC MAGAZINE

DECEMBER, 1910

CONTENTS

Race Prejudice in the Far East — MELVILLE E. STONE
ILLUSTRATED

Some Mexican Transportation Scenes — WALTER W. BRADLEY
WITH 10 ILLUSTRATIONS

The Isthmus of Tehuantepec, "The Bridge of the World's Commerce" — HELEN OLSSON-SEFFER
ILLUSTRATED

Hewers of Stone — JEREMIAH ZIMMERMAN, D.D., LL.D.
WITH 11 ILLUSTRATIONS

Agricultural Possibilities in Tropical Mexico — DR. PEHR OLSSON-SEFFER
WITH 18 ILLUSTRATIONS

An Interesting Visit to the Ancient Pyramids of San Juan Teotihuacan — A. C. GALLOWAY
WITH 9 ILLUSTRATIONS

A North Holland Cheese Market — HUGH M. SMITH
WITH 17 ILLUSTRATIONS

An Ideal Fuel Manufactured out of Waste Products — GUY ELLIOTT MITCHELL
ILLUSTRATED

PUBLISHED BY THE
NATIONAL GEOGRAPHIC SOCIETY
HUBBARD MEMORIAL HALL
WASHINGTON, D.C.

$2.50 A YEAR 25 CTS A COPY

XUM

NATIONAL GEOGRAPHIC SOCIETY

HUBBARD MEMORIAL HALL

SIXTEENTH AND M STREETS, WASHINGTON, D. C.

HENRY GANNETT . . . PRESIDENT — O. H. TITTMANN . . VICE-PRESIDENT
O. P. AUSTIN . . . . . SECRETARY — JOHN JOY EDSON . . . . TREASURER
GILBERT H. GROSVENOR, EDITOR AND DIRECTOR — F. B. EICHELBERGER . ASST. TREASURER
JOHN OLIVER LA GORCE, ASSISTANT EDITOR

BOARD OF MANAGERS

1908-1910

ALEXANDER GRAHAM BELL
Inventor of the telephone

HENRY GANNETT
Chairman of U. S. Geographic Board

J. HOWARD GORE
Prof. Emeritus Mathematics, The Geo. Washington Univ.

A. W. GREELY
Arctic Explorer, Major Gen'l U. S. Army

GILBERT H. GROSVENOR
Editor of National Geographic Magazine

GEORGE OTIS SMITH
Director of U. S. Geological Survey

O. H. TITTMANN
Superintendent of U. S. Coast and Geodetic Survey

JOHN M. WILSON
Brigadier General U. S. Army, Formerly Chief of Engineers

1909-1911

O. P. AUSTIN
Chief U. S. Bureau of Statistics

CHARLES J. BELL
President American Security and Trust Co.

T. C. CHAMBERLIN
Professor of Geology, University of Chicago

GEORGE DAVIDSON
Professor of Geography, University of California

JOHN JOY EDSON
President Washington Loan & Trust Co.

DAVID FAIRCHILD
In Charge of Agricultural Explorations, Dept. of Agric.

A. J. HENRY
Professor of Meteorology, U. S. Weather Bureau

C. HART MERRIAM
Chief U. S. Biological Survey

1910-1912

HENRY F. BLOUNT
Vice-President Am. Security and Trust Co.

C. M. CHESTER
Rear Admiral U. S. N., Formerly Supt. U. S. Naval Observatory

F. V. COVILLE
Botanist, U. S. Department of Agriculture

JOHN E. PILLSBURY
Rear Admiral U. S. N., Formerly Chief Bureau of Navigation

RUDOLPH KAUFFMANN
Managing Editor, The Evening Star

T. L. MACDONALD, M. D.

WILLIS L. MOORE
Chief U. S. Weather Bureau

S. N. D. NORTH
Formerly Director U. S. Bureau of Census

To carry out the purpose for which it was founded twenty-two years ago, namely, "the increase and diffusion of geographic knowledge," the National Geographic Society publishes this Magazine. All receipts from the publication are invested in the Magazine itself or expended directly to promote geographic knowledge and the study of geography. Articles or photographs from members of the Society, or other friends, are desired. Contributions should be accompanied by an addressed return envelope and postage, and be addressed:

GILBERT H. GROSVENOR, EDITOR

ASSOCIATE EDITORS

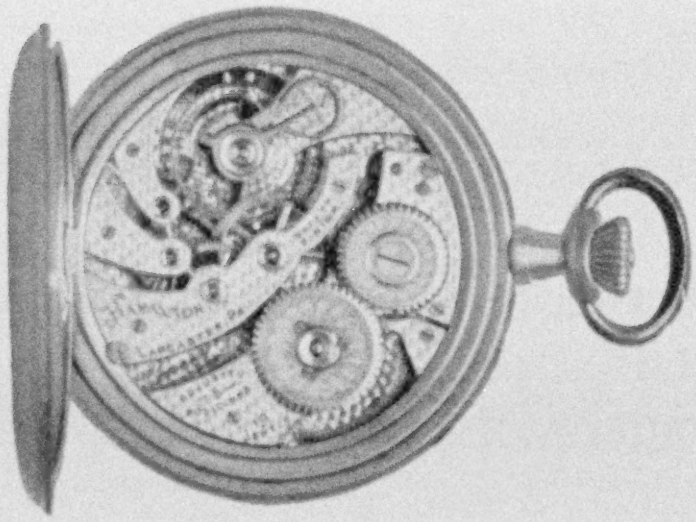
A. W. GREELY
C. HART MERRIAM
O. H. TITTMANN
ROBERT HOLLISTER CHAPMAN
G. K. GILBERT
ALEXANDER GRAHAM BELL
DAVID T. DAY
DAVID FAIRCHILD
HUGH M. SMITH
N. H. DARTON

Copyright, 1910, by National Geographic Society, Washington, D. C. All rights reserved

Entered at the Post-Office at Washington, D. C., as Second-Class Mail Matter

The HAMILTON

TWELVE SIZE—THIN MODEL



No. 900—Twelve Size Open Face—Thin Model

After 17 Years of the World's Best Watch-Building, the Hamilton Watch Company Offers Its Grandest Achievement

The "Hamilton" Twelve Size

TWENTY-ONE OTHER STYLES EVERY ONE A MASTERPIECE

For Sale by ALL First-Class Jewelers

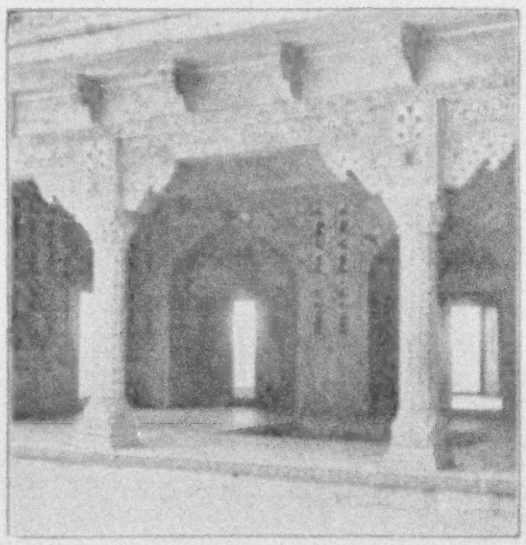
HAMILTON WATCH CO., LANCASTER, PA.

Makers of

The Railroad Timekeepers of America

Your courtesy in mentioning the Magazine when writing will be appreciated

Of Special Interest
in the January SCRIBNER



On the Way to India

By PRICE COLLIER

Author of
"England and the English from an American Point of View"

The first of a new group of articles on ***The West in the East,*** by the author of one of the most successful and talked of books of recent years. While dealing especially with what ***England has accomplished in India,*** these articles discuss with great clearness and knowledge the new responsibilities that America has assumed in the Orient and the rise and position of Japan among the great world powers. They have the same qualities that made the author's former articles so instructive and entertaining—keen observation, trenchant wit, frank criticism, and yet an evident spirit of fairness. ¶ Send your subscription ***now.*** An illustrated prospectus will be sent free on request. $3.00 a year, 25c. a number.

Charles Scribner's Sons .. New York

Your courtesy in mentioning the Magazine when writing will be appreciated

Scribner's Holiday Books

AFRICAN GAME TRAILS

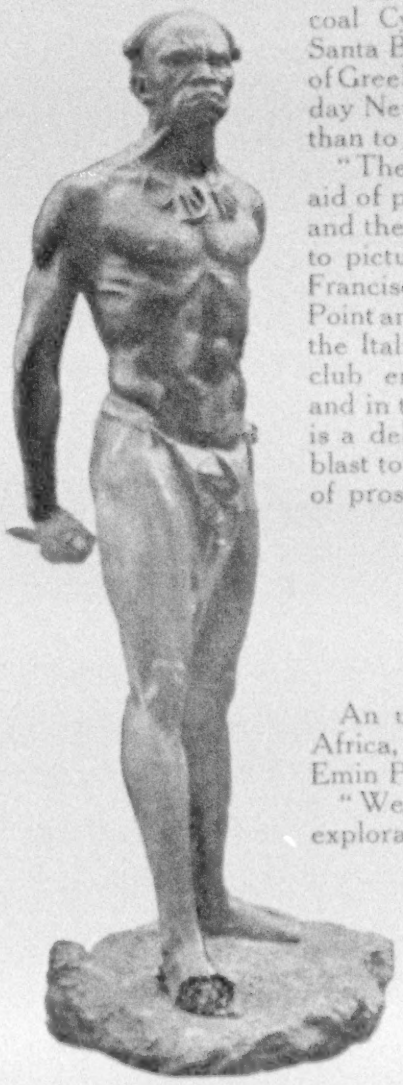
By Theodore Roosevelt

Splendidly illustrated with photographs by Kermit Roosevelt and others; also with drawings; $4.00 net; postpaid, $4.33

"The descriptions are good and graphic, intermingled with remarks and deductions such as might be expected from so careful an observer. . . .
"The volume is full of incident and interest."—*The Athenaeum.*

"It is a lesson in fine book-making. It is bound in brown silk and gold and is plentifully illustrated. The type is clear, easily read, and well proportioned to the pages of fine, heavy-wove linen paper."—*Balto. Evening Sun.*

ROMANTIC CALIFORNIA. By Ernest Peixotto



"His own illustrations, from black charcoal Cypress Gardens, or sepia-washed Santa Barbara Mission, to pencilled outline of Greek Theater, seem from prosaic present-day New York rather 3,000 miles to the east than to the west.

"The author guides his readers, with the aid of pen and pencil, through the missions and the remains of the Spanish occupancy, to picturesque points within reach of San Francisco, to the Farallones and Pescadero Point and the Sierras. He takes them among the Italian vine-growers, to the Bohemian club entertainment under the giant trees, and in the track of Bret Harte's heroes. It is a delightful book, an effective counter-blast to the commercial and material spirit of prospering California."—*New York Sun.*

80 illustrations by the author. $2.50 net; postpaid, $2.72

A VOICE FROM THE CONGO

By Herbert Ward

An unrivalled picture of wild life and the wilder natives of Central Africa, by one of the officers with Stanley on his expedition to rescue Emin Pasha.

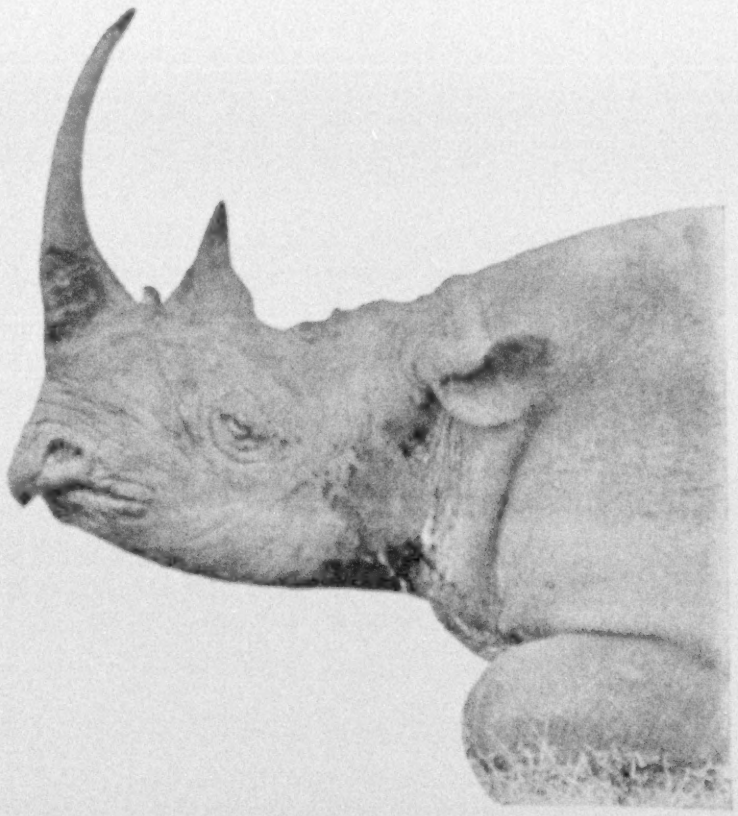
"We have had records innumerable of African hunting trips, African explorations, and the like, but the human side has been overlooked. It is this which gives piquancy to Herbert Ward's "A Voice from the Congo," in which the author, who started in to chum with the natives when he was fifteen and has been at it ever since, knowing their language and getting at their very heart, tells things new, quaint, and interesting about them. It is a big book but not a heavy one, and the narrative style makes largely for the greater charm of it."—*Cleveland Leader.*

Illustrated. 8vo, about $2.50 net; postage extra.

Charles Scribner's Sons . . Fifth Avenue, New York

The big book on hunting in Africa. This book is the result of many expeditions by a great hunter.

THE BIG GAME *of* AFRICA



By Richard Tjäder

Mr. Tjäder is a traveler and hunter of vast experience. He has conducted several expeditions to Africa in search of big game, the most recent being for the American Museum of Natural History in New York. On one trip he brought back to this Museum over thirteen tons of valuable specimens, including the head of an elephant larger than Barnum's famous "Jumbo."

This book is, in the main, a popular natural history of African big game, based upon careful personal observation. A chapter is devoted to each of the more important animals.

A distinguishing feature is a chapter of practical advice to prospective hunters in Africa as to outfits, guns, and ammunition, personal equipment, cameras, etc., with warnings and cautions.

Of great value to scientists as well as to travelers and hunters is the closing chapter on the Ki-Swahili language, with vocabulary and key, from which a practical knowledge of the East African trade language may be quickly obtained.

To the lover of travel and adventure the book will afford unusual entertainment.

63 illustrations and a specially prepared map. 8vo, cloth, gilt top, uncut edges, $3.00 net.

D. Appleton & Company, 35 West 32d Street, New York:

Please send me postpaid one copy of **The Big Game of Africa**, for which I inclose herewith $3.00.

Name _____

Address _____

Date _____

Your courtesy in mentioning the Magazine when writing will be appreciated

Booklovers Shakespeare

40 Vols. 7,000 Pages

JUST THE THING FOR A HOLIDAY GIFT

The dainty elegance, the solid worth, and the deserved popularity of **The Booklovers Shakespeare** make it just the thing for a holiday gift. It can be appreciated by all, whatever their degree of culture. Every detail of letter-press, paper, and binding is marked by luxury and charm, and our easy terms are a boon to those who feel the financial pressure of the "festive season."

$1.00 SECURES AN ENTIRE SET SENT FREE FOR EXAMINATION

A complete set of **The Booklovers** will be sent free for examination prepaid to any address, on receipt of the coupon below properly filled out. ***No money need accompany this coupon.*** The set may be returned at our expense if it fails to please you. Examination will cost you nothing and it places you under no obligation. If the books are what you want you can keep the entire set and send us One Dollar only, and you can pay the balance at the rate of $2.00 a month.

BOOKS THAT ARE WORTH WHILE

Most of us take less thought about books than about anything else we purchase. If we bought our books with the same care that we devote to clothes, or food, or furniture, we should have a well-chosen, worth-while library instead of a mere haphazard collection of volumes. One of the foundation stones of every good library, big or little, is a complete set of Shakespeare.

The Booklovers is printed in large type with ample margins, from new and perfect plates on pure white paper of a high grade. There are 40 dainty volumes of great beauty, 7 x 5 inches (just the size for easy handling), 7000 pages in all, handsomely and durably bound in half-leather and superbly illustrated. There are 40 full-page plates in colors and 400 reproductions of rare wood-cuts.

Special Features

Topical Index

in which you can find instantly any desired passage in the plays and poems.

Critical Comments

on the plays and characters. They are selected from the writings of Coleridge, Hazlitt, Dowden, Furnivall, Goethe and many other world-famed Shakespearean Scholars.

Glossaries

A complete one in each volume explaining every difficult, doubtful or obsolete word.

Two Sets of Notes

One for the general reader and a supplementary set for students.

Arguments

These give a condensed story of each play in clear and interesting prose.

Study Methods

which furnish the equivalent of a college course of Shakespearean study.

Life of Shakespeare

by Dr. Israel Gollancz, with critical essays by Walter Bagehot, Leslie Stephen, Thomas Spencer Baynes and Richard Grant White.

AN $8.00 ART PORTFOLIO FREE

Every year at Christmas time we are swamped with late-arriving orders which cause delay, disappointment, and inconvenience to our customers and to ourselves. As an incentive to promptness we have decided to offer ***absolutely free of charge a Magnificent Art Portfolio*** to each one of the first 200 whose orders reach us in time. This portfolio contains 16 plates reproducing in duogravure famous Shakespearean pictures and photographs of views in the Shakespeare country. It would cost $8.00 if bought in an art store.

HALF-PRICE HOLIDAY OFFER

The regular price of **The Booklovers** has recently been advanced from $58.00 to $62.00. During the holiday season, however, we offer a small edition of the work at just half price—$31.00. To secure one of these bargains you must act promptly. Send the coupon now. To-morrow may be too late. It is your privilege to return the set if it does not please you.

12-10
N.G.M.

The University Society
New York

You may send, prepaid, for my examination, a set of the Booklovers Shakespeare in half-leather binding at your special price of $31.00. If the books are satisfactory, I shall pay you $1.00 within five days after their receipt, and $2.00 each month thereafter for 15 months. If they are not, I shall notify you.

Name.....

Address.....

If you prefer cloth, change 15 mos. to 12.

THE UNIVERSITY SOCIETY, 44-60 E. 23d Street, New York

Your courtesy in mentioning the Magazine when writing will be appreciated

Order for *Christmas*

The Toll of the Arctic Seas

By **Deltus M. Edwards.** Fully illustrated and with a map showing routes of the chief expeditions; 8vo, $2.50 net; by mail, $2.70.

A popular, comprehensive story of the human side of the whole Battle of the Far North, including the inspiring tragedies of Barents, Bering, Hudson, Franklin, and Hall;

The heroic trip of Nindemann, of the ***Jeannette,*** to save twelve dying men, told by himself the first time;

The story of the last days of Captain De Long and his eleven men;

The eight months' drift, on an ice-floe in the middle of Baffin Bay, of Captain Tyson and eighteen men, women, and children, told by Captain Tyson;

The stirring adventures of Dr. Kane and Dr. Hayes;

A full story of the Greely expedition, including narratives of one of the survivors, presented for the first time;

The scientific achievements of Nordenskiold, Amundsen, Sverdrup, Dr. Nansen, the Duke of the Abruzzi, and others, and the success of Commander Peary, and a summary of all other expeditions.

Our Search for a Wilderness

By **Mary Beebe and C. W. Beebe,** Curator of Birds in the N. Y. Zoological Park and author of "The Bird; Its Form and Function, etc." 398 pp., 8vo, $2.75 net; by mail, $3.00.

An account of two ornithological expeditions to Venezuela and British Guiana, with 165 noteworthy illustrations from photographs by the authors.

"The best book of its kind that has appeared in many a day."—***Literary Digest.***

Four Centuries of the Panama Canal

By **W. F. Johnson.** With 16 illustrations and 6 colored maps. $3.00 net; by mail, $3.35.

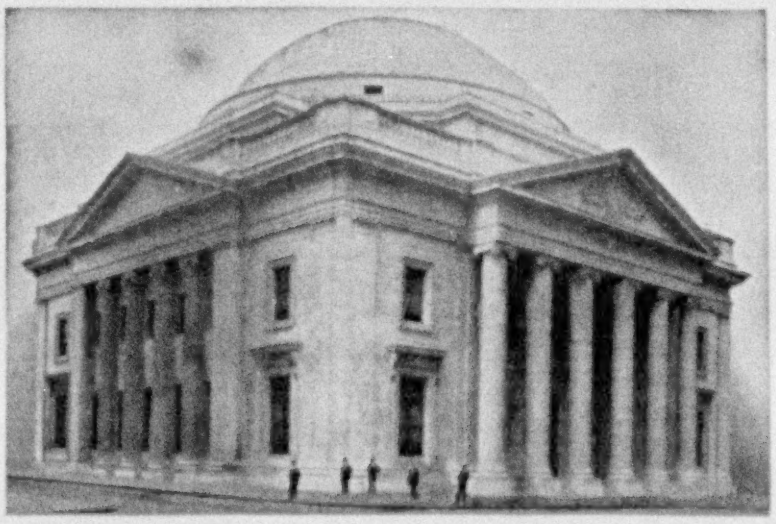
"The most thorough and comprehensive book that has yet appeared on the Panama Canal."—***N. Y. Evening Post.***

The Life of a Fossil Hunter

By **Charles H. Sternberg,** with introduction by Prof. H. F. OSBORN. 48 ills., $1.60 net; by mail, $1.75.
The autobiography of the best known explorer in this field.

HENRY HOLT AND COMPANY . . . 34 West 33d Street, New York

CHARTERED 1836



GIRARD TRUST COMPANY

PHILADELPHIA, PA.

CAPITAL AND SURPLUS, $10,000,000

OFFICERS

EFFINGHAM B. MORRIS, President

WILLIAM NEWBOLD ELY	1st Vice-President	ALBERT ATLEE JACKSON	2d Vice-President
CHARLES J. RHOADS	3d Vice-Pres't & Treas.	E. S. PAGE	Secretary
GEORGE H. STUART, 3D	Assistant Treasurer	SAMUEL W. MORRIS	Assistant Secretary

Your courtesy in mentioning the Magazine when writing will be appreciated

A Royal Present

The 22 beautiful volumes which comprise The New International Encyclopædia are a royal gift which will compliment the intelligence of giver and receiver. No other present can convey so much or will be used so much, reminding the recipient constantly of the giver and date of the gift.

The NEW INTERNATIONAL ENCYCLOPAEDIA

22 LARGE VOLUMES **70,000 HEADINGS** **OVER 20,000 ILLUSTRATIONS**

The New International is recognized as the best and most reliable encyclopædia of the day. It is the greatest work of the well-known publishing house of Dodd, Mead & Co. It is beautifully printed, richly bound and profusely illustrated, having among its illustrations hundreds of rich color-plates, duotints and photogravures. Its style is graphic and much easier to understand than other encyclopædias. It is arranged on a plan which makes it easier to consult than other encyclopædias. The information is brought down to 1910, the latest information available.

Bindings: Cloth Buckram, half Russia, and full Russia. The work is notable for fine presswork, excellent paper and fine binding.

Terms: Cash, with discount; or our easy payment plan.

Write for Our 80-page Book

Your name and address sent us on th ecoupon will bring book of specimen articles and specimen illustrations (in colors and in black) with colored illustrations and descriptions of bindings and full descriptions of all departments.with prices and terms. If you write on your letterhead, or otherwise identify yourself, and request it, we will send sample volume (any binding) for examination.

Get information at once, so as to give time for delivery before holidays.

Dodd, Mead & Co., 449 Fourth Avenue New York City

FILL OUT AND MAIL THIS COUPON

141N.G.M.

DODD, MEAD & COMPANY
449 Fourth Ave, New York City

Send me at once, without expense or obligation, your 80-page prospectus - book of specimen pages with prices and terms for The NEW International Encyclopædia.

Name.....

Occupation.....

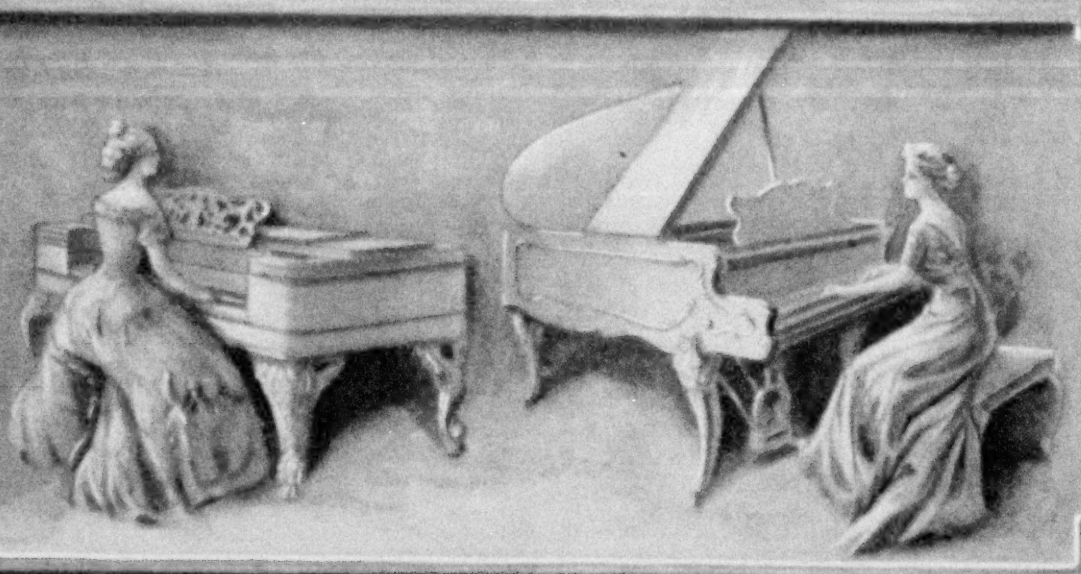
Bus. Address.....

Residence .....

Town..... State.....

Your courtesy in mentioning the Magazine when writing will be appreciated

FAMOUS IN THE MIDDLE OF THE 19TH CENTURY AND IN THE 20TH CENTURY—SUPREME



KRANICH & BACH PIANOS

THE VIOLYN PLATE

IN THE KRANICH & BACH PIANO

adds the most important element of perfection that all piano manufacturers have worked thirty years to obtain.

¶ This marvelous improvement now makes possible a longer sustained, much purer, and more voice-like tone than has ever before been obtained from an Upright piano. And it keeps the piano in perfect tune a much longer time than any piano without it.

¶ The Kranich & Bach is the *only piano* in the world constructed with the "Violyn" plate. ∴ ∴

An interesting little book describes it fully and will be sent free to those writing for our new catalogue.

KRANICH & BACH

233-45 East 23d Street New York

Your courtesy in mentioning the Magazine when writing will be appreciated

A Tour of the World in the BURTON HOLMES TRAVELOGUES

30,000 Miles of Travel

Through 40 Cities and Countries

Cost $250,000 and 20 Years' Work

4,000 Pages of Descriptive Text

5,000 Half-tone Etchings

36 Full-Page Color Plates

(and you can secure all of them for a few cents a day)

A Tour of the World!

What a fascinating prospect these magic words conjure up! ***A Tour of the World!*** The first enchanting glimpse into the lands that lie beyond our doors; the mingling with entirely new peoples, the viewing of strange scenes and customs;—the phenomenal mind-broadening it effects; the liberal education it conveys!

Perhaps you have longed many times to make this marvelous trip yourself, only to be obliged to dispel the idea because of business, health, family ties, or the question of finances. Is this so? *Then*—

Perhaps, too, you are not aware of the fact that all the pleasures, experiences and value of such a tour may be had for a tithe the cost of an actual tour, and without stirring from your own threshold?

☛ ***We are prepared to demonstrate this to you.***

If you will avail yourself of this opportunity to secure the **Burton Holmes Travelogues**, you will retain more vivid recollections of a trip through the strangest parts of the world, with the famous world-traveler, E. Burton Holmes, as companion and guide, than if you had made the actual tour alone.

In a series of splendid journeys Mr. Holmes unfolds before your eyes the beauties of travel in foreign lands, with such narrative skill, with so many strange experiences, incidents and humorous episodes, and so admirably illustrated by over 5,000 photographs taken on the spot by Mr. Holmes himself as to carry you in spirit over 30,000 miles of travel, through Forty of the most interesting countries and cities in the world.

It would cost you $50,000.00 and many years of your time to take these journeys; but don't take our word for it.

—WRITE US TODAY and we will send you a beautifully illustrated booklet containing sample pages and color plates—a full description of the work, and tell you how you may secure the **TRAVELOGUES** for a few cents a day.

N.C.M. Dec.

Mail the Coupon Now ☛

McClure's Tourists' Agency
44 E. 23d St.
New York City

TEAR OFF, SIGN AND MAIL TODAY

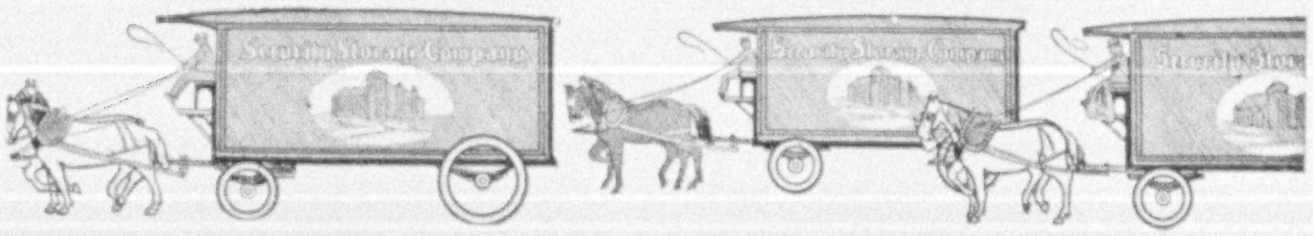
McClure's Tourists' Agency
44 East 23d St., New York City

Gentlemen:—I am interested in the **Burton Holmes Travelogues** and will be glad to receive specimen pages in colors and to learn the terms upon which I can secure the twelve handsome volumes referred to in the foregoing advertisement.

Name.....

Address.....

Your courtesy in mentioning the Magazine when writing will be appreciated



If You Wish to Ship Goods Abroad

Send for rates, routes, and full information, addressing "Forwarding Department." If you expect to send an automobile abroad, get our rates first.

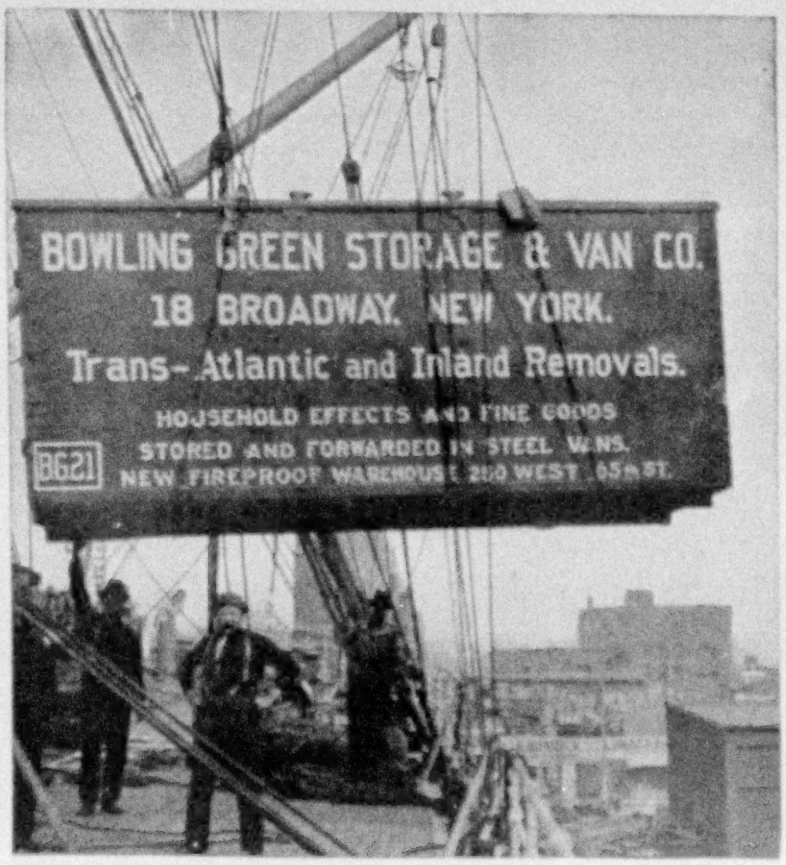
Insurance on goods in transit by rail or sea, covering risks of fire, derailment, collision, marine risks, and theft. Burglary, theft, and larceny insurance. For rates and information address "Insurance Department"

Security Storage Company

Formerly Storage Department
American Security and Trust Company

Furniture Warehousemen . . Packers . . Forwarding Agents

1140 FIFTEENTH ST. (Send for Illustrated Descriptive Booklet and Price List) WASHINGTON, D. C.



HOISTING LIFT-VAN ON BOARD STEAMSHIP

LIFT-VANS can be provided for immediate loading in any city in the United States or in Europe.

¶ Their use insures a minimum of handling, security for small packages, and least possible risk of damage.

BOXING NOT REQUIRED

IN WASHINGTON, APPLY TO

Security Storage Co.

1140 Fifteenth Street N.W.

BOWLING GREEN STORAGE AND VAN COMPANY

18 Broadway, New York

Cable Address: Bowlingvan, New York — Codes: A B C, Fifth Edition, Lieber's Code

Your courtesy in mentioning the Magazine when writing will be appreciated

VOL. XXI, No. 12 WASHINGTON DECEMBER, 1910

THE NATIONAL GEOGRAPHIC MAGAZINE

RACE PREJUDICE IN THE FAR EAST

By Melville E. Stone

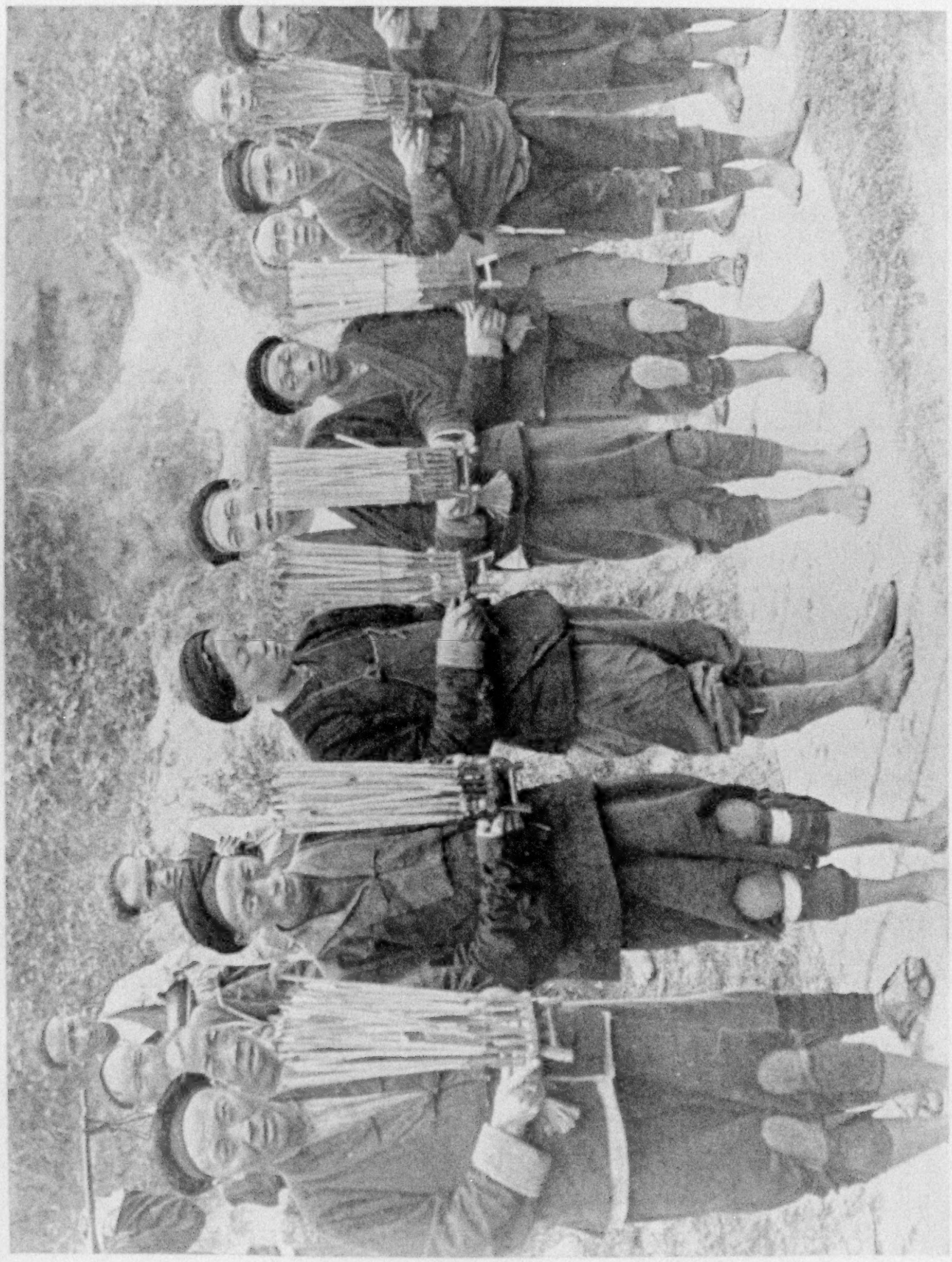
General Manager of the Associated Press

ALTHOUGH whole libraries have been written concerning Asia and the Asians, there is a widespread belief that, because of the differences in our mentalities, it is not possible for us ever to understand them, or they us. Kipling says that "East is East, and West is West, and never the twain shall meet." The "oldest inhabitant" in India or China or Japan is sure to tell you that the Oriental mind is unfathomable. I have not the temerity to challenge these opinions. And yet I venture to suggest that there is an older authority holding a different view, and that I still have some respect for Cicero's idea that there is a "common bond" uniting all of the children of men.

And whatever our ignorance of, or indifference for, the Orientals in the past, it is well to note that conditions, both for us and for them, have entirely changed within the last decade. There is a new United States and a new Asia. The Spanish War created the one; the Russo-Japanese War the other. When we acquired the Philippine Islands we assumed the government of eight millions of Orientals and touched elbow with all Asia. When Japan defeated Russia, the Oriental learned his power. For untold centuries he had respected power. His native sovereign was an autocrat, who enslaved him, beat him, killed him, if need be. Then came the European, with powder and guns and warships; and thereafter the white man behind the gun represented power. A handful of British with cannon could enforce obedience from hundreds of millions of people. Suddenly the little Empire of Japan, one of the least among the Asiatic powers, challenged, fought, and defeated the great European Colossus, Russia.

The Asian discovered then that it was not the white man, but the gun that did the business; he learned that a yellow man behind the gun was quite as effective as a white man, and he found that the Christian soldier alone was afraid of death. Then followed in travail the birth of the new Asia. There were actual revolutions in Turkey and Persia, a startling recrudescence of unrest in India and Ceylon, and, at this moment, China is in a state of revolutionary ferment.

What is to be the outcome? What does all this mean for the future of the world? Let us view the problem from the political, the commercial, and the moral aspects. How long will the 6,000 soldiers we have in the Philippines be able to keep our flag afloat among 8,000,-



Thousands of pilgrims come every year from all parts of China to visit the shrines and temples of the sacred mountain of Hunan, Nan Yoh Shan, one of the five sacred peaks of China. Early in October more than 10,000 pilgrims arrive daily. Some of the pilgrims travel from their homes on foot, coming great distances. They kneel and bow their heads down to the little stools which they carry in their hands every five, seven, or ten steps, according to the vow they have made. At one end of the stools are many sticks of incense, the burning of which is part of their worship. In a large majority of the cases the vows have been made on behalf of a sick mother, and the journeys are taken as an expression of thanksgiving in case of recovery, or as a prayer for mercies in the other world in case of a fatal issue of the illness. The leader of the above group, who stands at the extreme left, has made annual pilgrimages for 20 years. Photo from F. A. Keller, by courtesy of "China's Millions," of Toronto.

ooo of natives? How long will the 75,000 English soldiers in India be able to maintain British sovereignty over 300,000,000 of Asians? Believe me, these are not idle questions. They are up to us for an answer, whether we will or no, and upon our ability to make answer will depend the future of what we are pleased to call our Western civilization. I would not be an alarmist, and yet I would have you feel that Macauley's suggestion of the New Zealander on a broken arch of London Bridge, sketching the ruins of St. Paul, has come to be more than an extravagant figure of speech.

And I am convinced that there is real danger awaiting us unless we mend our ways. It is not the Asian who needs educating; it is the European. I am not worrying half so much about the heathen in his blindness as I am about the Christian in his blindness.

Asia is awake and preparing for the coming struggle, and we are doing very much to force the issue and to prepare her for the contest. For a century we have been sending at enormous cost our missionaries to all parts of the hemisphere to civilize. There may be doubt as to the amount of proselyting we have been able to accomplish: there can be no possible doubt of the work we have done to strengthen the Asian people politically and commercially.

A statesman of Japan said recently, in a conversation I had with him: "Your missionaries undoubtedly have done good for the morals of our people, but they have done far more for our health and strength as a nation. They come to us with doctors, and nurses, and hospitals, and schools. Before Perry's arrival 2,000,000 infants were born every year in Japan, and for lack of proper sanitary measures they died. Now, with the hospitals and sanitary and hygienic methods introduced by the missionaries, the 2,000,000 children are born, but they do not die." This is true of every other Oriental country. Meanwhile, in the countries of Europe the increase of population is slow, and, in some countries, as in France, it is hardly increasing at all. In America race suicide is becoming alarmingly prevalent.

In the recent war between Russia and Japan, Dr. Louis Seaman, who visited their field hospitals and talked freely with their army surgeons, found that the Japanese had outstripped us in almost every department of military surgery. The foreign colonies of Tokio and other Japanese cities employ native physicians in preference to Europeans.

Asia is coming into her own again. It was Asia through Arabia which gave Europe the literature, the arts, and the sciences, which we have developed and of which we now boast. Gunpowder was probably invented in China; it was certainly introduced into Europe from Arabia. The finely-tempered steel of Damascus went over from Arabia at the time of the Moorish invasion of Spain, and its manufacture was continued at Toledo. The coppersmiths of Bagdad supplied the world's market with their wonderful productions centuries before there were any industries in Europe. Weaving of silk and cotton had its birth as an industry in Arabia, and the weaving of wool was learned by the Crusaders in the same wonderful country. Astronomy, mathematics, the mariner's compass—all came to us from the Arabs.

One cannot have forgotten that the Psalms, the Gospels, and the Koran are all of Arabian origin. The inhabitants of central Arabia have today the oldest liberal government—practically a republic—on earth. And, if you go farther afield, to India, and China, and Japan, you shall find a civilization older than history and marvelous in its character. One cannot read that great library of Eastern Sacred Writings, edited by Dr. Max Müller, without being tremendously impressed.

It will not do for us to assume that ours is the only civilization. What are the basic virtues, the sum of which we call our Christian civilization? I hope we are all agreed that they are not primarily beliefs in certain theological dogmas, or certain forms of church polity,

SOME PUPILS OF THE METHODIST EPISCOPAL DAY SCHOOL, BANGALORE, SOUTH INDIA: THE BOYS' SCHOOL HAS 80, THE GIRLS' SCHOOL 50 PUPILS

or in the shape or length of priestly vestments, but in the attributes of correct Christian living. Is frugality a virtue? Your Asian far exceeds us in frugality. Is industry a merit? No people on earth work as long, as persistently, and as conscientiously as they. Is integrity esteemed? It is the unchallenged judgment of every European writer that the word of an Asian was good until they were corrupted by the inroads of Westerners. Is politeness, which is but another name for the golden rule, to be commended? Nowhere will you find such scrupulous politeness as is daily and hourly observed east of Suez.

Is observance of law desirable? The peaceable and orderly lives which the great mass of the people of Asia have led for centuries attest their habits of obedience. There are cities in India, Japan, and China with crowded populations running from a hundred thousand into the millions where there is scarcely the semblance of police control, and where crime is hardly known. They are a calm, thoughtful people, to whom what Mr Arthur Benson has so well called "the gospel of push," and what our own vigorous Roosevelt calls a "strenuous life," is unknown. But I am not at all sure that this is an unmixed evil, for there are no "brain-storms" there, and neurasthenia is provided for nowhere. In the light of the fact that the number of inmates in the insane hospitals of our country doubled in six years, according to the latest available statistics, I cannot but feel that we need less strenuosity rather than more. Compared with Western civilization, theirs will not suffer perhaps as much as you would imagine; and perhaps you will agree that the chief characteristics of our civilization are push and extravagance, and that in this respect they have the better of us.

All this brings me to my topic. And I must say that, paraphrasing Mr Lincoln's words at Gettysburg, in large measure it is not for us to educate, but to be educated. We shall never meet the problems growing out of our relation with the Far East unless we absolutely and once for all put away race prejudice. I believe the European snob in Asia is distinctly the enemy of the civilized West. And his coadjutor in this country is a fitting criminal yoke-fellow. Let me give you some illustrations of what I mean—cases which came under my personal observation. From Bombay to Yokohama there is not a social club at any port or treaty point where a native, whatever his culture or refinement, will be admitted.

At the Bengal Club at Calcutta last year a member in perfectly good standing innocently invited a Eurasian gentleman—that is, one who is half native and half European—to dine with him. It became known that the invitation had been extended, and a storm of opposition broke among the members. The matter was finally adjusted by setting aside the ladies' department of the club, and there the offending member and his unfortunate guest dined alone. The next day the member was called before the board of governors and notified that another like breach of the rules would result in his expulsion.

The beating of native servants and workmen in India is a daily and hourly occurrence. It formerly was so at Hongkong and Shanghai, but Mr Sprague, the representative of the Standard Oil Company at Shanghai, told me that since the Russo-Japanese war the natives would not stand it, and that all beating of them by Europeans in that city had ceased.

While in Calcutta I attended a ball at Government House, and noted that while one or two native princesses were on the floor dancing with white men, there were twenty or more native gentlemen standing about as "wall flowers." I called the attention of Lady Minto to the fact, and she explained that no white woman would think of dancing with a native; it would certainly result in ostracism.

The son of a maharaja goes to England, is educated at Oxford or Cambridge, is lionized in the West End of London—mayhap he is honored with an

XUM

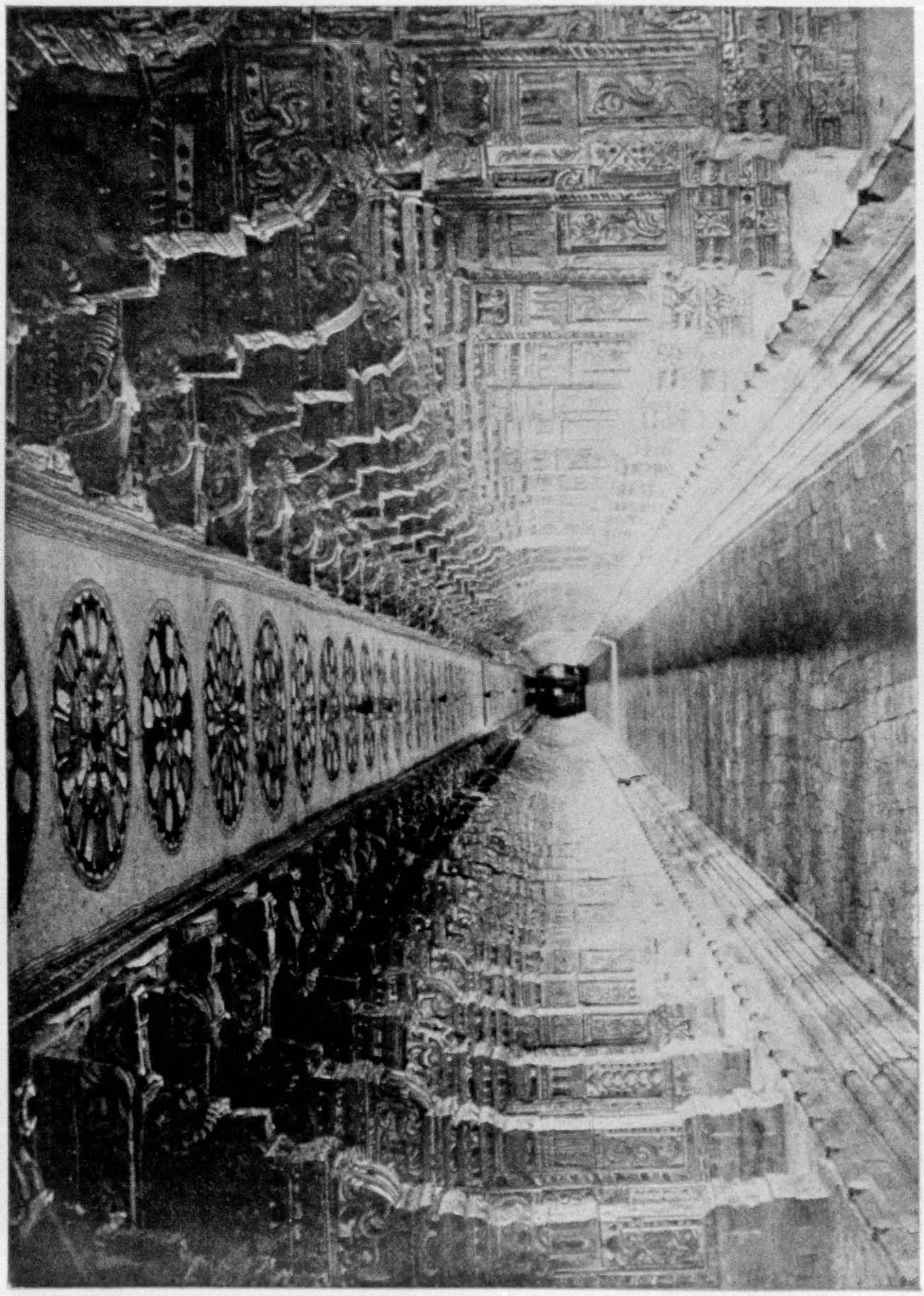


Photo by courtesy of New York Times

THE INTERIOR CLOISTER OF AN ANCIENT HINDU TEMPLE OF INDIA

invitation to Windsor. When he goes back home he may enter no white man's club; if he be fortunate enough to be invited to a white man's function, no white woman will dance or associate with him, and if by any luck he should marry a European, he, his wife, and his children become outcasts.

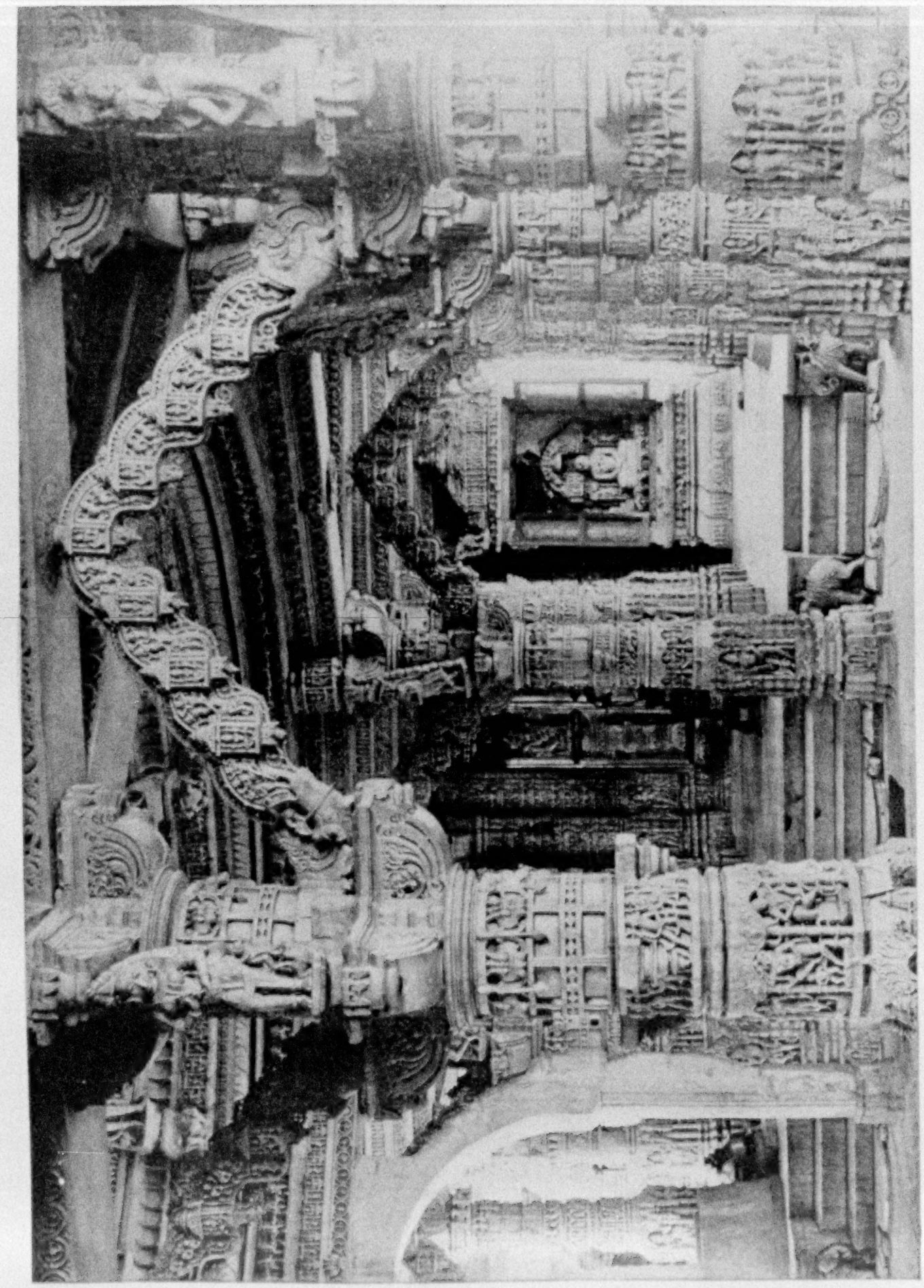
Although native troops, like the Sikhs, have shown undying loyalty to the British flag, and on frequent occasions have exhibited courage in the highest degree, no one of them ever has or ever can achieve the Victoria Cross.

I have no thought, in saying this, of criticising British rule in India. I do not question that it has been of enormous benefit. Neither do I doubt that under the administration of Lord Morley there is the most sincere desire to do all for India that the cause of humanity or Christianity may dictate. And I am also quite ready to say that the problem is a difficult one; that "the white man's burden" is one not easy to bear. I know that attempts to do justice are often misunderstood by the natives, are construed as evidence of fear. I know that the Bengalis, who are responsible for most of the unrest in India, are a silly lot, whose lives and property would not be worth a groat were British protection withdrawn. I know that the beneficent British supremacy has been made possible only by the religious divisions among the natives. But this is all the more reason why the greatest care should be exercised not alone in India, but throughout Asia, why the line of cleavage should not be permitted to pass from a religious to a racial one, and the danger that it may do so grows with every hour.

On the one hand, there is a very perceptible loosening of the bonds of religious caste; not infrequently today high-class Brahmins not only shake hands with Moslems and Christians, but even sit at table and eat meat with them. On the other hand, there was startling evidence during the recent war of the secret racial tie that binds all Asia. We are accustomed to think and speak of India as a British possession, forgetting that after all only five-eighths of its area is British, while there are over 600 native princes and chiefs, each governing a state, which is more or less independent. Some of these princes are enormously wealthy. So far as they have any religious bent, they are Hindu, or Mahratta, and in this respect not at all at one with the Japanese, who are either Shinto or Buddhist. Yet while the war was on, it was not uncommon for a rich Maharaja to call at Government House and ask if it would be regarded as an unfriendly act for him to buy Japanese bonds. Of course, the viceroy was forced to say it would not, since Britain and Japan were in treaty alliance. Of course, these investments were made through London banks, and the extent of the transactions will never be known. We do know, however, that there was a mysterious absorption of Japanese securities, which never could be accounted for by either the London financiers or our own.

What I feel is that the danger of Asiatic ethnic solidarity is immensely accentuated by the attitude of certain of the British themselves. It goes without saying that the younger son of a British nobleman, who does not succeed to his father's estate and does not go into trade, but who finds the only outlet for his activities in the army or navy, the church, or in the Indian civil service, becomes far more of a snob, and therefore far more of a danger when dealing with natives in Asia than he would be permitted to be at home in England. And the harm that one such person can do it may take an army to undo.

I have spoken thus freely respecting the conditions in India because I feel at liberty to do so, since my mother was born under the British flag, and I have a very large number of relatives in the British army, navy, and church. But I should be wholly lacking in fairness if I did not ask your attention to similar cases of race prejudice in which we are



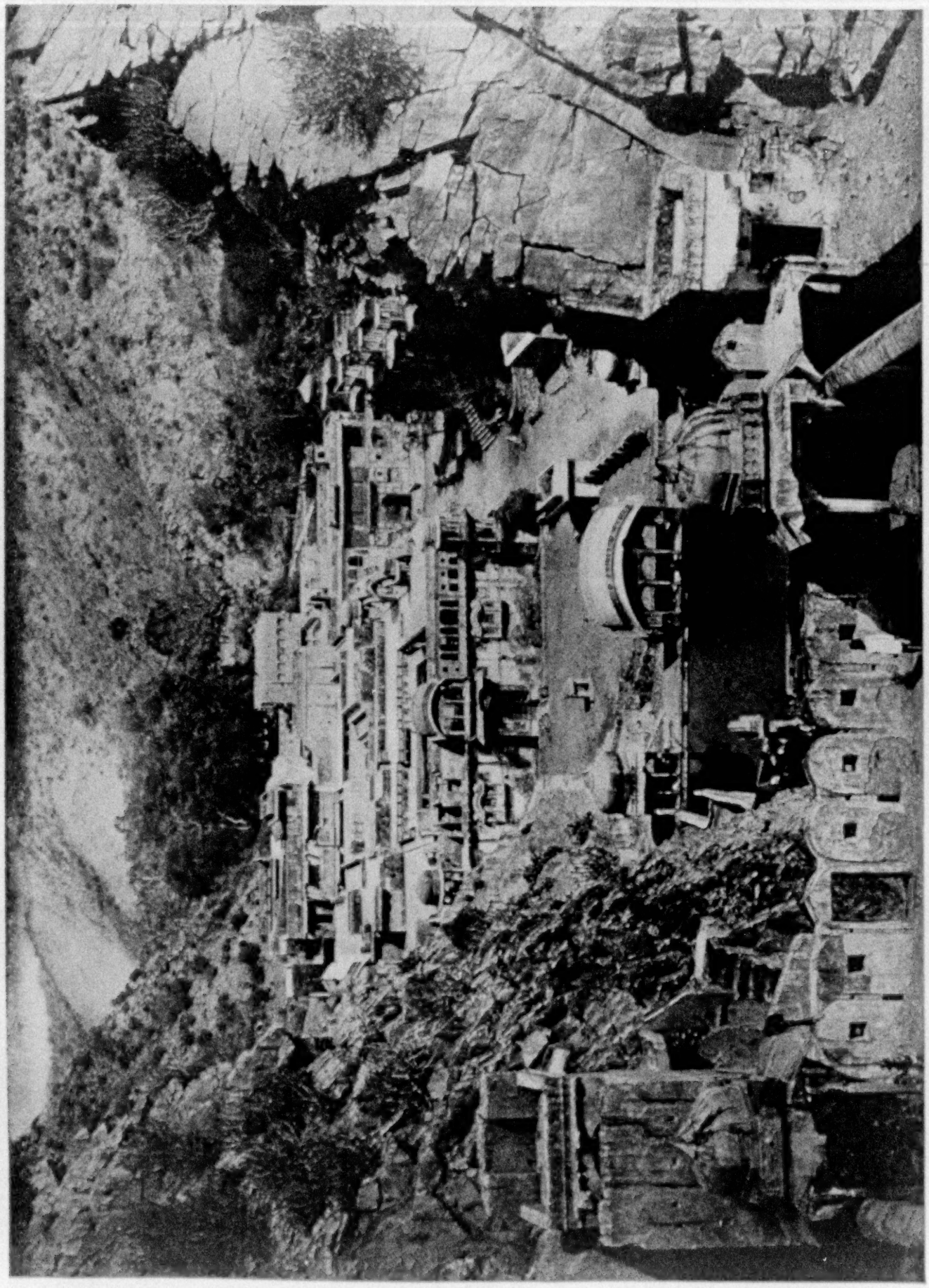
INTERIOR OF THE JAIN TEMPLE AT DILAWAR

Photo by courtesy of New York Times

Photo by courtesy of New York Times

THE CARVED CEILING OF THE JAIN TEMPLE AT DILAWAR

Jainism is an important sect of the Hindus, claiming no less than a million believers. This religion arose as a protest against Brahmanism about the same time as did Buddhism. Unlike the latter, however, it never spread beyond the bounds of India. The Jains are among the wealthiest and most influential members of the Hindu community, devoting their energies largely to mercantile pursuits.



TEMPLES AND TOMBS AT JEYPORE

Jeypore, perhaps the handsomest of the native towns of India, lies about 850 miles northwest of Calcutta. The city was founded in 1728 and is surrounded by a formidable wall. It has paved streets 111 feet wide, running at right angles to each other. It is the capital of the province of the same name.

involved and which are equally dangerous in other parts of Asia.

Let me tell you a story as it was told me by a Harvard graduate, who is now a minister of the Japanese Crown. "When Perry came here," said he, "and Townsend Harris (of blessed memory) followed him and made the first treaty with Japan, it was stipulated that we (the Japanese) should give them ground for their legation and their consulates, compounds. We did so. Yokohama was then an unimportant place, a native fishing village. It was the natural port of Tokio, but as we had no foreign trade that meant nothing. We gave them ground in Yokohama for their consulate. Merchants and traders followed, and we gave them ground also for their shops. The British and the Russians and other European nations came in and we gave them like concessions. In Yokohama, as you know, houses and stores are not numbered as you number them in America—110 Broadway, for instance—but are numbered in the order in which they were built. Thus, "Number 1 Yokohama" may be half a mile distant from "Number 2 Yokohama." This method of numbering still survives.

"Well, as time went on the village grew into a city. Under the treaty of Townsend Harris and all the other treaties the right of extra-territoriality was recognized. That is, whenever a case arose in which a foreigner was involved it must be tried by the consul of the country to which the foreigner belonged. As time went on, Sir Harry Parks, the British minister, asked for ground in Yokohama for a race-track. We cautiously suggested that horse-racing was said to be wicked by the European missionaries. But he insisted and we gave him the ground. Then we were asked for ground for a social club for the foreigners, and we gave them a plot on the sea front, the finest piece of land in the city.

"Later they wanted to play cricket and football, and finally golf. Well, we gave them ground for this. As the city grew, this cricket-field was so surrounded by buildings that it was practically in the center of town. Understand, all of this ground was donated. Last year we suggested that we could use the cricket-field, and we offered to give in place of it a field in the suburbs. As railways had been built meanwhile, the new field would be even more accessible than the old one was when we gave it. The foreigners demurred, and proposed that we buy the old field and with the purchase-money they would secure a new one. Finally, we compromised by paying for their improvements and furnishing them a new field with like improvements free of cost.

"The question of taxation arose. Yokohama had grown to be a city of 300,000 inhabitants, with millions of dollars invested in buildings owned by foreigners. We asked no taxes on the ground we had donated to them, but we did think it fair that they should pay taxes on their buildings. They said no, that everywhere in the West the buildings went with the ground. We submitted the question to the Americans, but they dodged the issue, saying they would do whatever the others did. Then, under the law of extra-territoriality, we were compelled to leave the decision to the British consul, and he decided against us. The case has now gone to The Hague Court.

"Finally, when I tell you that in the light of this history no native Japanese gentleman has ever been permitted to enter the club-house or the grand-stand of the race-track or to play upon the cricket-field, perhaps you will understand why there is some feeling against foreigners in Yokohama."

When Commodore Perry went to Japan in 1853 he wrote a letter to the Japanese Emperor containing these words:

"With the Americans, as indeed with all Christian people, it is considered a sacred duty to receive with kindness, and to succor and protect all, of whatever nation, who may be cast upon their

shores, and such has been the course of the Americans with all Japanese subjects who have fallen under their protection."

With his warships Perry compelled Japan to receive citizens of the United States and to grant them extraordinary domiciliary rights. From that day to this we have spent enormous sums to establish schools in Japan for the education of the natives. Yet we now are seeking to deny them admission to this country and we are refusing to permit them to attend our schools.

In the Philippines a ruffian American soldier, recruited from the purlieus of New York, shoves a native gentleman from the sidewalk of Manila with an oath, calling him a "nigger." Yet that "nigger" is very likely a cultivated gentleman, educated at the Sorbonne, in Paris.

The infamous opium war upon China, and the equally infamous existent compulsion of China to receive Indian opium, are outrages no whit worse than our own extortion of absurdly exorbitant damages for losses of American ships to Chinese pirates in the Yellow Sea. For many years there was no more profitable undertaking for the owner of an American clipper ship than to sell it and its cargo to the Chinese government after it had been looted by the pirates.

Such, my friends, is something of the shameful record of our relations with the Far East. In India, in China, and in Japan we have been the guests who have enjoyed their hospitality, only to rise in the morning and say to our hosts, "You must not sit at table with us." Believe me, this condition cannot endure. Politically we are in grave danger. Commercially, with their industry and their frugality, they are fast outstripping us.

They have ceased buying flour from the Minneapolis mills, because they are grinding Indian and Manchurian wheat with Chinese labor at Woosung. A line of ships is running from the Yellow River to Seattle, bringing 72,000 tons a year of pig iron manufactured at Hankow, and delivered, freight and duty added, cheaper than we can produce it. In Cawnpore, India, with American machinery they are making shoes so cheaply that the manufacturers of Lynn can no longer compete with them. The cottons and silks which we one time sent from here to Asia are now made in Japan and China.

Thus are we related to them politically and commercially. Socially they are all saying to us, "Stop cheating us; stop swindling us; stop your treating us as your inferiors who are to be beaten and robbed." Japan is crying out, "Treat us fairly and we will go more than half way. Leave to us the question whether Japanese laborers shall go to America to annoy you, and we will stop them. But do not say that you will admit the lazaroni of Hungary and Italy and Russia, simply because they are white, and shut us out because we are yellow.

The Singhalese natives of Ceylon, while I was in Colombo, addressed a remarkable communication to the Governor General. They said a hundred years ago there was established in the United States a new theory of government—that there should be no taxation without representation. "Now," said they, "we ask a share in the government of the island. We pay taxes. You may fix a property qualification and say that no one having less than a thousand pounds sterling shall share in the government. We shall not object. You may also fix an educational qualification. You may say that no one but a college graduate shall take part in the government. We will not object. In short, you may fix any qualification except a racial qualification. That would not be fair." "And what answer have you to make?" I asked Mr Crosby Rolles, editor of *The Times*, of Ceylon. "To meet their request," he replied, "would mean to turn over the government of Ceylon to them at once, because there are 6,000 of them and only 5,000 English men, women, and children. We must stop educating them."

What do you think of that for a remedy? Personally, I do not think it will work, any more than I think any rule of arbitrary repression can endure.

I take refuge in the large experience and ripe judgment of Lord Curzon, of Kedleston, who in July, 1904, was given the freedom of the city of London in Guildhall, and on that occasion used these words: "Depend upon it, you will never rule the East except through the heart, and the moment imagination has gone out of your Asiatic policy your empire will dwindle and decay."

I am also impressed with the correctness of Lord Morley's attitude. Speaking in support of the Indian reform proposals two years ago, he said: "The Founder of Christianity arose in an Oriental country, and, when I am told that Orientals always mistake kindness for fear, I must repeat that I do not believe it, any more than I believe the stranger saying of Carlyle, that after all the fundamental question between any two beings is, Can I kill thee, or canst thou kill me? I do not agree that any organized society has ever subsisted upon either of those principles, or that brutality is always present as a fundamental postulate in the relations between rulers and ruled."

And Curzon and Morley have many supporters in their view. In smug complacency, you may close your doors which look toward Asia, while you open wide those which look toward Europe; you may refuse the Oriental admission to your schools, while you accord the privilege to any child of a European; you may pile import duties mountain high, and raise our standards of living to any pitch of extravagance; you may build warships without limit, and you may continue to treat the Asian as legitimate prey. But I am confident that it will not avail.

As a soldier, whether at Omdurman, in the Sudan, or on 203-Metre Hill, at Port Arthur, the man of color has shown himself a right good fighting man; in commerce he has, by his industry, perseverance, ingenuity, and frugality, given us pause; and before the eternal throne his temporal and his spiritual welfare are worth as much as yours or mine.

SOME MEXICAN TRANSPORTATION SCENES

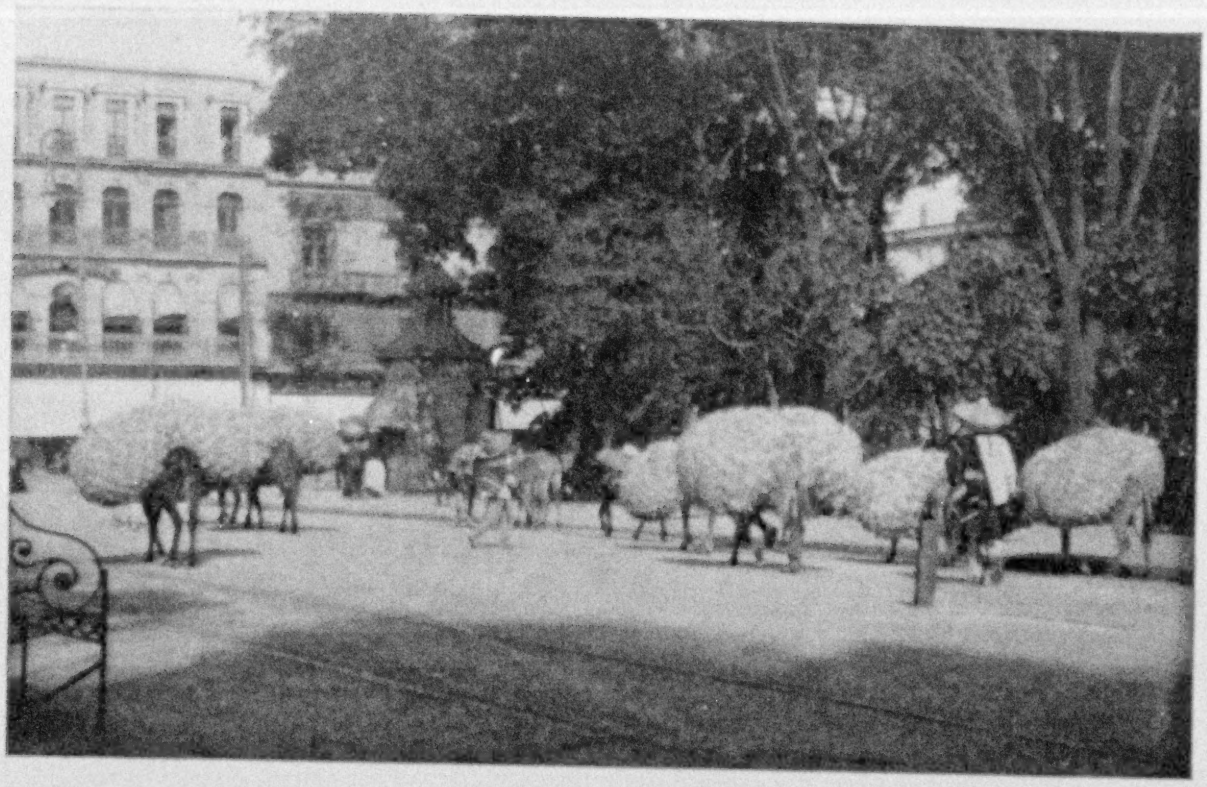
By Walter W. Bradley

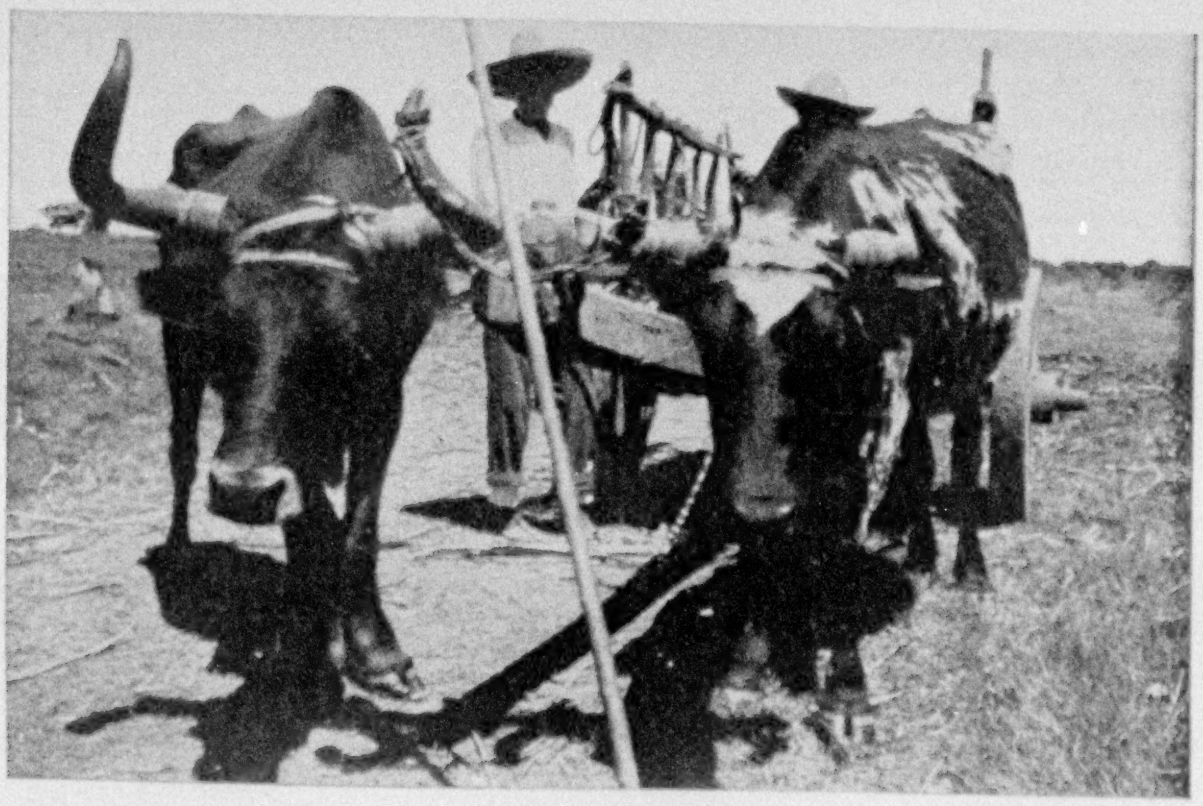
With Photographs by the Author

In Mexico one may find all of the modern conveniences of travel and transport, including the Pullman, automobiles, and electric street railways; for, in Mexico City, the capital of our sister Republic, they have quite as complete and effective a street and suburban system of electric railways as is to be found in any city of the United States. While this is true, it is not the intention of the present sketch to describe any of the above modes of travel; but rather to depict some less familiar scenes, which are in part at least the relic of earlier days.

The contrast seen in these ancient and modern methods side by side is striking, at times. The writer one day on the outskirts of Mexico City while riding on an electric car passed a "peon" (laborer) carrying on his shoulder a wooden plow, such as we read of as in use in Palestine in the time of Christ. Picture 1 shows burros packing straw through the streets of the city, and was taken while passing in front of the cathedral, which fronts on the main plaza. The electric street-car tracks may be noted in the foreground.

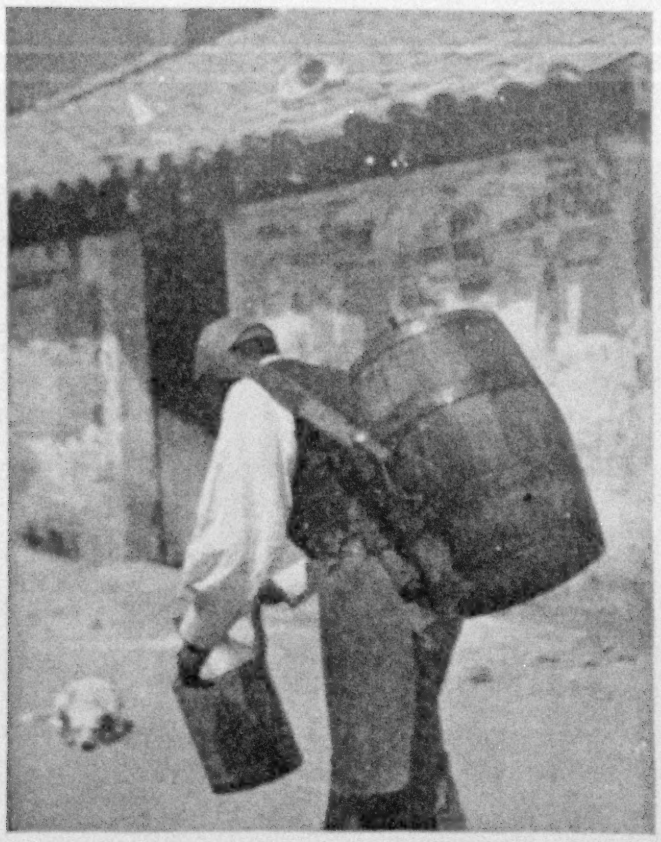
Picture 2 illustrates the use of oxen for motive power in transportation. The Mexicans do not use a shoulder yoke for oxen, but a single stick of timber is lashed with heavy leather thongs to the





PICTURE 1. BURROS CARRYING STRAW; MEXICO CITY (SEE PAGE 985)

PICTURE 2. OX CART AT SINALOA



PICTURE 3. THE WATER VENDER

back of the animal's horns. Sometimes the yoke of the wheel span is lashed rigidly to the timber projecting from the cart; and at each roll and jolt of the cart over the rough mountain roads the poor brutes' heads are yanked and jerked to first one side and then the other.

Picture 3 is of an "aguador" (water vender), at Cuernavaca, capital of the State of Morelos, one time home of Cortés and Maximilian. The can in front of him, used for serving the water from the barrel, is also hung by a strap from his head. The Mexican peon is rarely seen carrying even the smallest package in his hands—he must hang it from his head or shoulders, or stow it inside the high crown of his "sombrero" (as in the case of small parcels). The writer has seen a peon buy a centavo or two of peanuts from a street vender, take them, loose, in his hands and toss them into the broad, turned-up brim of his hat, and stroll off down the street.

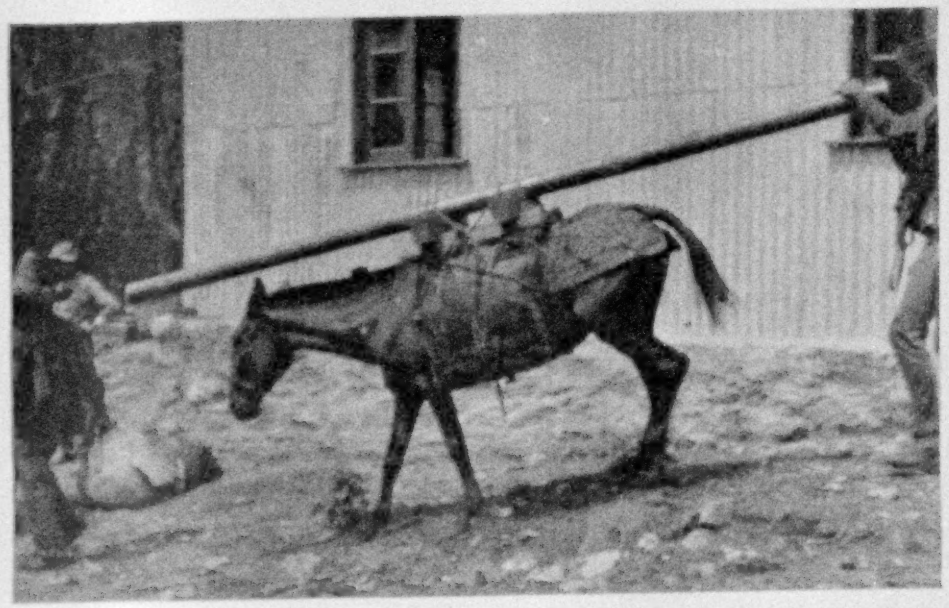
In Picture 5 may be seen another method of carrying water. The two men shown in Picture 4 have crates which are used to take farm produce and poultry to market. They have disposed of their loads in the city and are seen entering the Church of "Nuestra Senora de Guadalupe" (Our Lady of Guadalupe), the shrine of the patron saint of Mexico at Guadalupe.

The ancient method of hoisting ore in the Mexican mines was by means of the leather bag ("zurron"), one of which may be seen in Pic. 8. Though all of the larger mines are now equipped with modern machinery, the zurron may still be seen in small properties and in districts remote from the railroads. Often the zurroneros were mere boys; but they would carry their loads of 100 to 200 pounds up winzes and shafts, with only the precarious footing afforded by the "chicken-ladders" (notched poles four to six inches in diameter).

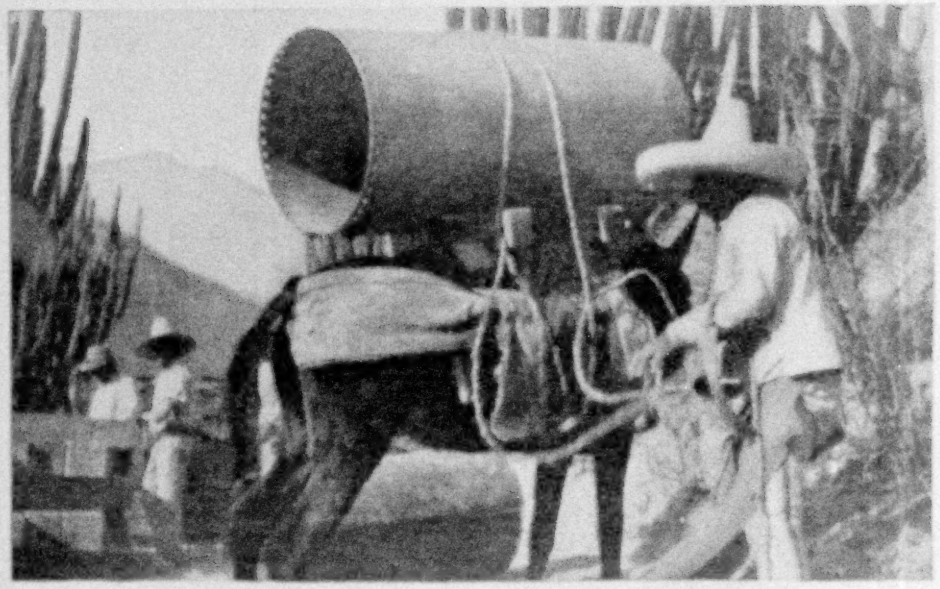
PICTURE 4. CRATES USED FOR CARRYING CHICKENS TO MARKET

XUM

PICTURE 5. WATER CARRIERS, SAN BLAS, SINALOA



PICTURE 6. TRANSPORTING A SHAFT WEIGHING 580 POUNDS TO THE CYANIDE PLANT



PICTURE 7. TRANSPORTING A JOINT OF PRESSURE PIPE FOR HYDRO-ELECTRIC POWER PLANT. WEIGHT, 396 POUNDS

XUM

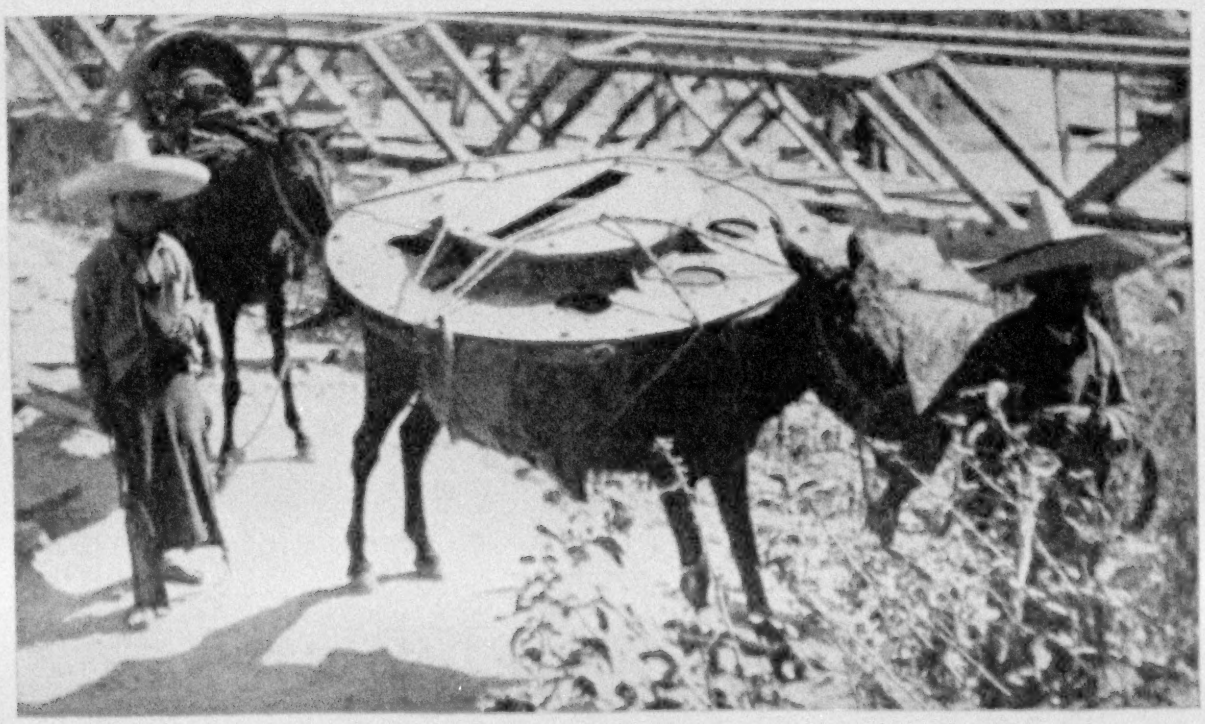
The mule-back method of transporting sectionalized mining machinery is not an unfamiliar sight in the mountain districts of the western United States; but some of the loads handled in this way by the Ventanas Mining and Exploration Co. (Ltd.), in western Durango, Mexico (with which the writer was assistant manager), are worthy of illustration.

The "time-honored" mule load was 300 to 350 pounds—a "carga" consisting of two pieces or packages weighing about 150 pounds apiece, one being lashed on either side of the pack saddle. A "cuarteo" is a box or single piece, which by reason of bulk or weight can only be handled singly. In sixteen months we took into Ventanas, over 105 miles of rough mountain trails, some 1,500 tons of heavy, awkward machinery and 1,000 tons of stores and supplies. Every ounce of this went in on either mule or burro back.

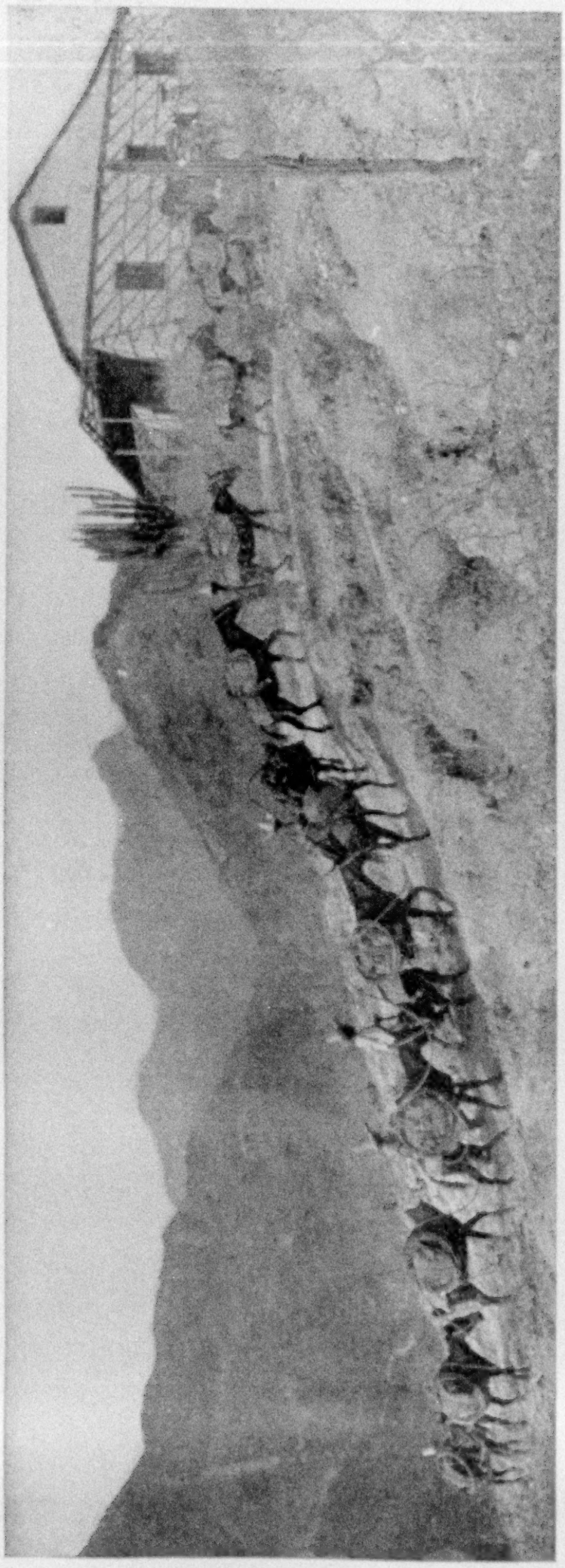
It is possible, by exercising judgment in assigning loads best suited to certain animals, to handle over rough trails loads of 475 to 500 pounds, and when necessary as much as 680 pounds, in one piece.

Picture 6 shows a piece of shafting 3 15-16 inches diameter, 13 feet 6 inches long and weighing 580 pounds. Thirteen of these shafts were thus transported to the mine on picked mules, two men being

PICTURE 8. THE ANCIENT BURDEN BEARER IN THE MINES



PICTURE 9. TRANSPORTING BY MULE TRAIN: MEXICO



PICTURE 10. CARRYING 2,300 FEET OF ⅞ STEEL AËRIAL TRAMWAY CABLE ON 12 MULES (SEE PAGE 990)

assigned to each mule—one man ahead with the lead-rope, the other behind to steady the load and prevent it from swinging and see-sawing. Heavy pieces like these were handled in relays, changing mules about every two hours.

The method of handling cables is shown in Picture 10, which is of 2,300 feet of seven-eighths-inch steel aërial tramway cable on 12 mules. "The coils were made up and tied with wire in the factory before shipping, each mule-load being divided into two parts, with about 12 feet of cable between each pair of coils. The coils were so arranged that each mule-load was about 236 pounds or 144 feet of one-inch, 230 pounds or 192 feet of seven-eighths-inch, 240 pounds or 354 feet of five-eighths-inch cable. The largest piece (about 4,000 feet) of one-inch cable required 26 mules for its transport. One man was assigned to each two mules. The mule at the head of the line was controlled by a lead-rope, and each mule's lead-rope was fastened to the pack of the mule in front of it. In this way they were kept at a uniform pace, and with the men distributed as indicated the entire train could be stopped simultaneously when necessary to tighten up the cinches or for other purposes."*

Picture 9 shows a tube-mill head-plate casting (in the lead), weight 200 pounds, and a tube-mill roller bearing, 385 pounds. The latter was an awkward piece to handle, not so much due to its weight as that it rested high on the "lomillos," a small wooden crib made of four 4 by 4-inch blocks, which rests

*"Mule-Back Transportation of Sectionalized Machinery," by F. C. Robert and Walter W. Bradley, Mining and Scientific Press, May 29, 1909.

on top of the saddle. A joint of one-fourth-inch gauge, 26 inches diameter, pressure pipe (weight 396 pounds) for the hydro-electric plant is shown in Picture 8.

A total of 600,000 feet B. M. of lumber was packed from saw-mill to mine (3 days' round trip) on burros and mules. The burros handled the lighter stuff—1 by 12 inches, 2 by 4, and 4 by 4. Each mule carried from 88 feet B. M. (2 pieces of 6 by 8 inches by 11 feet) up to 117 feet B. M. (2 pieces of 8 by 8 inches by 11 feet). Two pieces of 8 by 8 inches by 11 feet would weigh from 350 to 400 pounds, depending on the extent they had been seasoned, while a few very pitchy sticks, which were actually weighed, tipped the scales at 620 pounds for the pair.

THE ISTHMUS OF TEHUANTEPEC

"The Bridge of the World's Commerce"

By Helen Olsson-Seffer

THE advantages of the Isthmus of Tehuantepec as a line of communication between the two largest oceans of the world seem to have appealed to the minds of travelers and explorers from the very earliest times. Hernan Cortez predicted that it would become the great transcontinental highway. Alexander von Humboldt, who traveled in Mexico in the beginning of the last century, called the isthmus "the bridge of the world's commerce."

Nearly half a century ago the first attempts were made to dig a canal, and many railroad schemes were proposed from time to time. The first work was undertaken by the Mexican government in 1882, but it was not until 1907 that the Tehuantepec Railroad was formally opened, after a succession of failures and after years of unremitting labor.

The road, as it now exists, is in excellent condition, and bids fair to become a formidable rival to the future Panama Canal. With good harbors at each end of the road, with modern and labor-saving machinery and appliances for loading freight, and with regular communication across the oceans, the isthmus route offers great advantages to commerce. It shortens the distance between the East and West by several days.

While the route via Cape Horn from New York to Yokohama is 19,802 miles, that via Cape of Good Hope 18,085 miles, via the Suez Canal 15,527 miles, and via the Panama Railroad 11,256 miles, the distance via the Isthmus of Tehuantepec is only 10,006 miles. This latter route makes the distance from New York to Honolulu 1,273 miles shorter than the Isthmus of Panama route. At the present day, when rapid transportation is of primary importance, such a saving of time is an item worth consideration.

RIVER OF THE WINDING SNAKE

Before the days of the pioneer and forest roads, the Coatzacoalcos River (the River of the Winding Snake), emptying into the Gulf of Mexico, was the favored highway, and dug-outs poled by dusky natives carried freight and a few passengers up and down the river and its tributaries. Here and there a narrow mule-path trailing away from the banks of the river marked the entrance to some lonely plantation or village. To-day, however, the new stands side by side with the old. Fine steel boats run on the river, but the native still poles up and down in his dug-out canoe. Good roads and mule-paths have been made

NATIVE DUG-OUT CANOES AT TEHUANTEPEC, MEXICO

Photo from Russell Hastings Millward

from one plantation to another, but the old-time ox carts have not yet been discarded.

The town of Coatzacoalcos, at the mouth of the great river, has undergone the greatest change. Once a veritable fever hole, it is now rapidly being modernized and brought into some semblance of sanitation. Long wharves jut out from the water front, and fireproof warehouses and electric cranes give to the town a business-like appearance.

About this river, the Winding Snake, is woven a curious folk-legend, which explains to the native mind the origin of the tree called the *Rabo de Lagarto*, or the alligator's tail, which tree is very often seen in that part of the country.

This legend runs thus:

Many years before man was seen upon this earth, alligators in great numbers made their homes on the banks of the River of the Winding Snake, whiling away the time in sunning and warming themselves.

The young alligators often grew restless and curious of what lay beyond, over in the woods where the monkeys and parrots chattered and the great cats wandered about. "How wide is the forest?" and "Where do the paths lead to that wind away into the woods?" were questions they were continually asking each other.

One day, while the young alligators were sunning themselves on the bank, two very strange creatures came walking by and stopped to rest near the root of a big tree. One said to the other, "Do look at those alligators. They are exactly like the alligators on the other side of the mountains, and there the foolish people believe them to be gods and feed and care for them until they grow so big and fat that they can hardly move."

With that they moved along, leaving great excitement behind them in the river, for the young alligators were resolved to seek their fortunes on the other side of the mountains. Paying no heed to the warnings of their elders, they met at a certain bend of the river the following morning and set out swimming all day up stream. When night came they were so tired that they crept out from the river to sleep among the marsh weeds. Sleeping soundly, they did not hear the water gods who suddenly came upon them. These water gods were friends of the alligators, and had warned them long ago that they must never leave their homes. So, finding that they had been disobeyed, they summoned the spirit of the hills and commanded him to take the wanderers far into the forest and leave them standing on their heads. There they can be seen to this day turned into living trees. As time went on and the little alligators did not return to their home, the old ones lost hope and began to weep, shedding so many alligator tears that the mouth of the Coatzacoalcos River has ever since been salty.

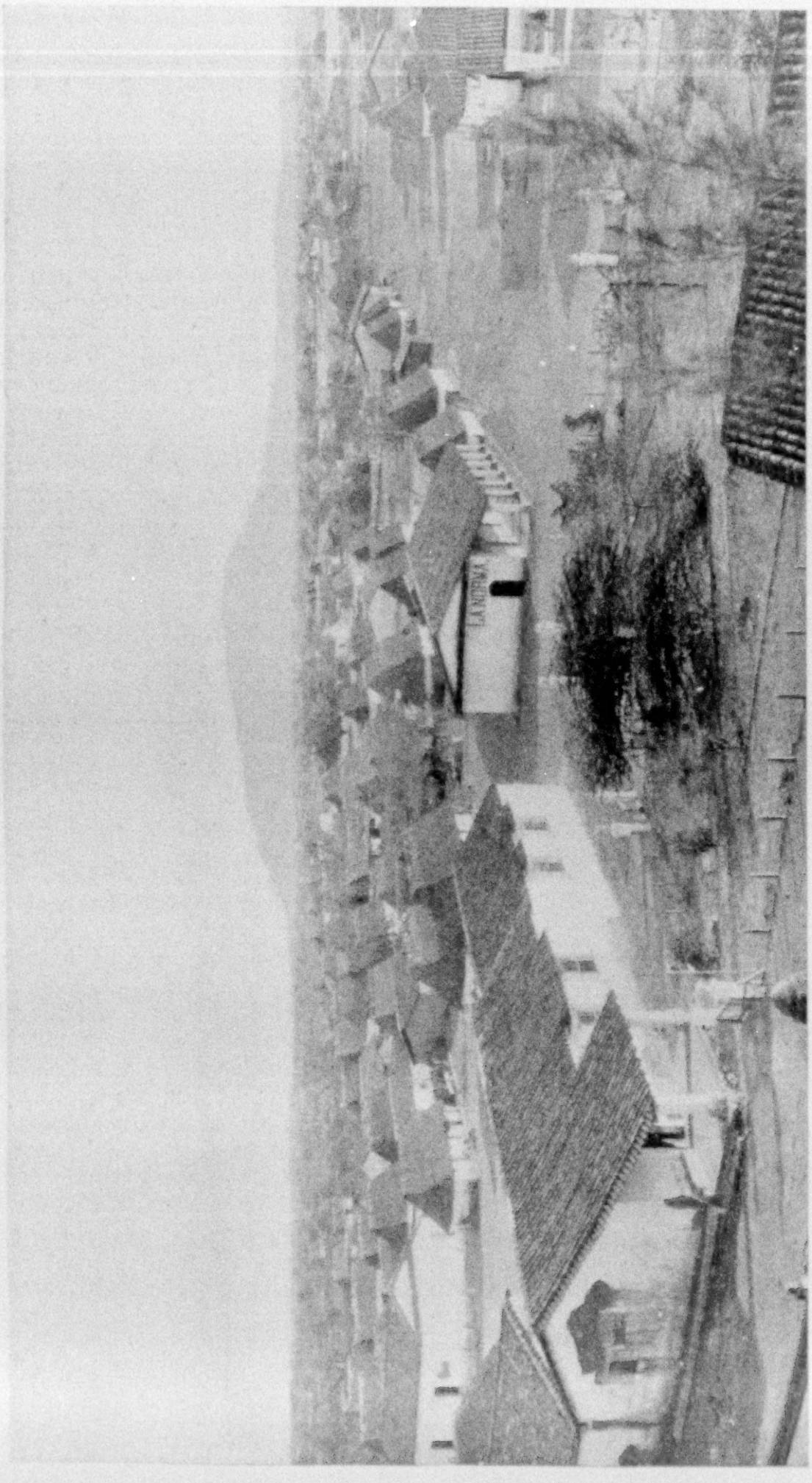
The "salty mouth" of the Coatzacoalcos, with a width of some 2,000 feet, forms a good natural harbor, and has been turned into the Atlantic port for the isthmus railroad.

ALONG THE ISTHMUS ROUTE

From Coatzacoalcos the road gradually begins to climb the Cordillera, which divides the Gulf slope from that of the Pacific. Much of the route lies through wild and beautiful country, with tall *manaca* palms (*Attalea cohune*) and forest trees topping a thickly matted jungle, and here and there a quaint little Indian village on the banks of a shaded, shallow river. The picturesque Malatengo Cañon, with its rocky chasms, is followed by the Chivela Pass, entered at a height of 735 feet above sea-level, the highest point on the isthmus.

Looking up from the bottom of this wild cañon, the walls appear almost to meet, and only a narrow strip of blue sky can be seen far above. Some days, when the Gulf wind drives the ocean clouds overhead, the cañon seems filled with mist and gloom. It is then that the wild legends and romantic tales that the Indians still tell of this region linger in one's mind.

Leaving the pass, the train crawls down the Pacific slope of the Sierra



THE TOWN OF SAN GERONIMO, ON THE TEHUANTEPEC RAILROAD, A SHORT DISTANCE FROM THE PACIFIC END OF THE LINE

Madre, running along for some distance by the banks of the Rio de Tehuantepec, then cutting off across country to Salina Cruz, the Pacific port.

Here the little Indian village of years ago has given place to a new town, built on higher ground and dotted here and there with comfortable bungalows, the homes of English residents.

Fierce "northers" rage on the isthmus the greater part of the year, and the long swell of the Pacific causes a heavy surf. As no natural shelter exists, it was found necessary to build one—an outer refuge harbor, and an inner harbor with dry-dock and wharves. This dry-dock, one of the finest in the world, and the wharves, steel warehouses, and gigantic cranes make a most up-to-date port.

It is difficult to realize the immensity of the work accomplished on the isthmus. Less than six years ago the conditions were very bad; fever and death or shattered health lurked in the forest, and heavy tropical rains destroyed in a few hours the labor of days. To one who has lived and traveled in these tropics before the advent of the steam horse, it is an odd sensation to enter a comfortable Pullman car and be rushed smoothly through the primeval tropical forest at the rate of 50 miles an hour. Humble natives with burdens on their backs stand staring at this monstrosity, which with a warning screech flashes by.

The country through which the railway runs is in many respects of great interest. The tropical nature, the many different tribes of Indians living along the rivers and in the hills, their peculiar customs and picturesque garb furnish an interesting study.

DESCENDANTS OF ONCE-POWERFUL TRIBES

The different Indians today inhabiting the isthmus, descendants of once-powerful tribes, still show enough distinctive characteristics to enable one to judge of their ancestors. The Agualulcos, Aztecs, Huaves, Mijes, Zapotecos, and Zoques are among these.

The Agualulcos and Aztecs dwell in the northern part of the isthmus. Though outwardly conforming to the Catholic religion, they still retain many of their old customs and superstitions.

Among these Indians the memory of Doña Marina, or Malinche, as the Indians called her, is still revered. Although acting as interpreter and guide to Cortez, she seems to have been greatly beloved by the Indians. In Jaltipan, her native village, there is an artificial mound about 40 feet high, called the "Hill of Malinche," and the natives, who still believe that Malinche is buried beneath this hill, contend that some day her spirit will return to sweep away the cloud that has hung over them since the Conquest.

The Mijes live in the mountains to the west, in the town of San Juan Guichicovi. They are exceedingly ignorant, bold, and rather repulsive in appearance. History classes them as having been at one time the most brutal and idolatrous of all the isthmus tribes.

The greatest ambition of a Mije is to possess more mules than his neighbor. Just why is hard to understand, as they prefer to carry their burdens on their own back.

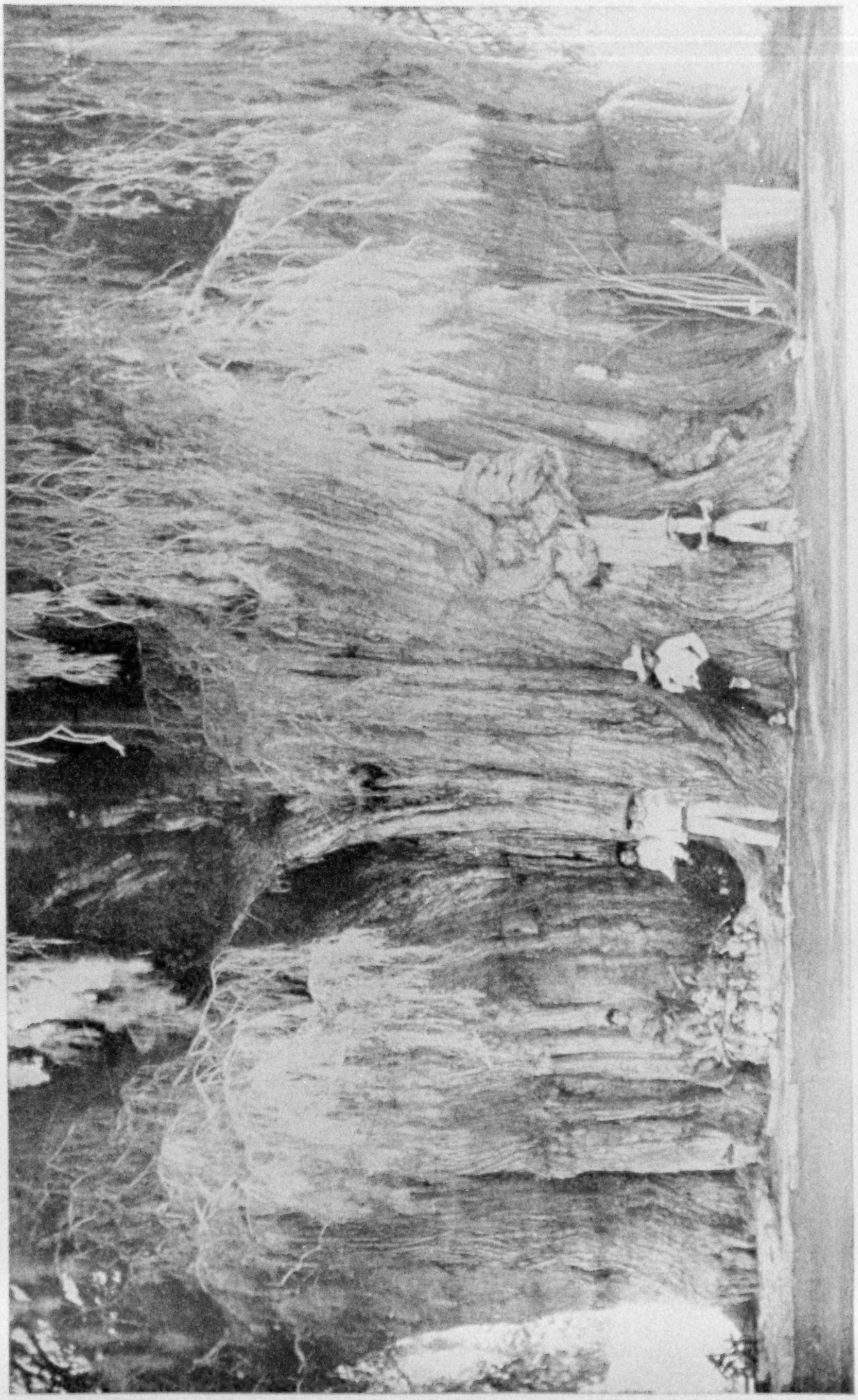
They get good crops of maize, beans, and rice from their *milpas*, which are well taken care of, but they work fitfully, are great drunkards, and very dishonest.

The Zoques, who live in the mountains between the Chichijapa Valley and the Rio del Corte, are, like the Mijes, very fond of *tequila*, the native alcohol, but more industrious, and of a more pleasing appearance.

The Huave tribe, now dwindled to a thousand or two, live in a few towns on the Pacific coast. They are very different from the other tribes, and claim to be descended from a powerful tribe in Peru.

The Zapotecos, who inhabit the greater part of the southern division of the isthmus, are hard working, gentle, and intelligent, and at one time were a highly cultured nation.

The various Indian languages are now little else than ill-spoken dialects



THE BIG TREE AT TULE, IN THE STATE OF OAXACA (SEE PAGE 1007) Photo from Russell Hastings Millward

NATIVE LABORERS Photo from Russell Hastings Millward

pieced out with Spanish words and sentences.

Somewhat below medium height, the Indians possess unusual muscular strength. They are often able to carry for several hours on their shoulders, under the rays of the tropical sun, cargoes weighing from 100 to 200 pounds. Deformed Indians among the isthmus tribes are very unusual. Their habits are exceedingly simple and their senses unusually acute, especially that of sight.

They still cling to their ancient mode of tilling the land with their primitive wooden plows. Foreign commerce, example—nothing has been able to shake their belief in the idea that their way is good enough.

The women are gracefully built, and in some tribes remarkably beautiful. With the exception of the Zapotecos, there is nothing unusual in the costume of these natives. They are garbed according to the climate, the women in heavy or light weight *cortes* and a chemise; the men in once-white cotton trousers and a shirt of the same material, with a *zarape*, if the weather be cool.

The mountain Indians wear an odd raincoat, much like the raincoat used by the Japanese peasant, made of plaited straw. These coats seem to shed the rain quite as well as our modern macintoshes, and certainly are much more picturesque.

TEHUANTEPEC, "THE HILL OF THE TIGER"

Tehuantepec is one of the important towns of the isthmus, and is mainly inhabited by Zapotecos. Its market place, "El Centro Mercantil," is always full of interest. Women of all ages sit here; tiny girls, exact miniatures of their mothers, play about.

From early morning the long, red-

tiled shed is the center of attraction. Women, children, pigs and dogs, baskets of flowers—the heavily scented gardenia and masses of pink geranium—imitation coral beads, hideous iguanas, *dulces* of many kinds, bananas and other tropical fruits—all lend themselves to the making of a scene at once picturesque and novel.

PICTURESQUE COSTUMES

The Tehuana women are beautiful. Their stately carriage, regular features, and beautiful soft brown eyes, added to their fascinating costumes, mark them with distinction and irresistible charm. They wear the usual Indian *corte*, or *enagua derollada* (rolled skirt), which is nothing more nor less than a straight piece of cotton cloth, generally one meter wide and two meters long, dyed red, blue, purple, or a checked red and white; a short chemise, or *coton*, sleeveless and with a low neck, coming just to the waist line. It is made of cotton material in different colors or of velvet, and shows to great advantage the tawny, perfectly formed arms and shoulders. The crowning touch, however, is their head-dress. Shaped somewhat like a short Japanese kimono, with a wide flounce of starched and pleated white cotton lace, it is thrown over the head so that the stiffened, lacey flounce stands out about the face like a fan-shaped frame. The rest of the garment, alas! hangs ignominiously down the back.

The more wealthy Tehuanas have a great quantity of jewelry—necklaces long enough to wind two or three times about the neck, falling down to the waist, and usually made of United States five-dollar gold pieces, alternating with irregularly shaped pearls, are the most favored. A small pendant, called *paloucta*, or little dove, made of gold, and somewhat resembling the wings of a dove, often of very fine workmanship and set with pearls, is worn by almost all Tehuana women, either suspended by a bit of dirty string about the neck or a string of imitation coral beads.

Instead of baskets, the women use large calabashes, which are dried and painted, some in vivid green with gaudy flowers trailing over them, others in red, and still others in yellow. These calabashes, called "*jicaras*," filled with fruit or other products, they balance on their heads as they walk.

NATIVE HANDICRAFT

During one of my visits to Tehuantepec, I had a lively chat with an elderly Tehuana, whose waving white hair, drawn gently back from her forehead, made a fitting frame for her regular, cameo-like features. She had come over to the market, she said, to look after the girl who was selling the cortes; she did not make much money now in the weaving and dyeing business, it was so hard to get cheap labor; times had changed greatly since she had begun her work. Noticing my interest in the cortes she had for sale, she offered to show me her home, and I followed her down the cobble-stoned street and turned into the arched doorway of a substantial adobe house, evidently quite an old place, square and one-storied, with a large brick *patio* in the center. Here in the *patio* was her work-shop.

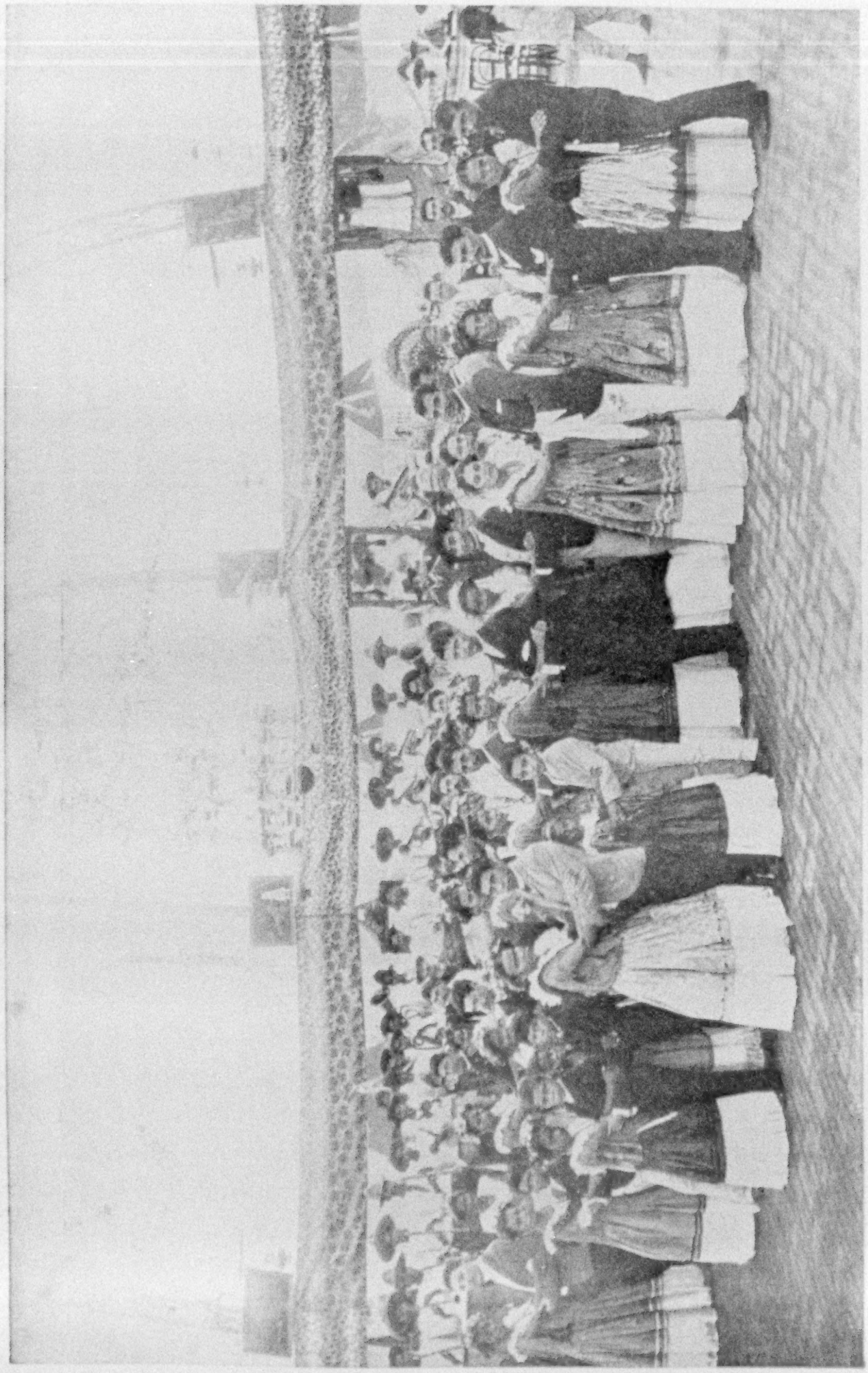
Three young men were lazily dipping pieces of cotton cloth into large caldrons of a dark blue dye, the *anil cimarron* of the Indians (*Indigofera anil*). After soaking a sufficient time the cloth was taken out and hung on a line to dry, and, when dried and pressed, was ready for the market. This indigo coloring is made in a very simple way. Branches of the *Indigofera* are boiled down in vats until the water is thoroughly colored with the dye. It is then left to settle, the solid part of the dye sinking to the bottom of the vat. The water is drawn off and the deposit is left in the sun to dry and harden. The blue *cortes* are very commonly worn, and can be bought for from three to six pesos.

THE ROYAL PURPLE

In a room off the *patio* two men were sitting before large, old-fashioned looms weaving the much-prized purple *cortes*. Each *corte* of this purple color costs the

Photo from Mrs H. Olsson-Seffer

A TEHUANTEPEC GIRL IN HER BALL GOWN



A DANCE DURING A FIESTA IN TEHUANTEPEC

Photo from Mrs H. Olsson-Seffer

enormous sum of 20 pesos. The manner in which the thread is dyed is in itself costly and tedious, and, when woven, is well worth the price.

There is a little cove on the Pacific coast, about two days distant from Tehuantepec, where the Huave Indians go laden with skeins of coarse thread. Here they wait until the tide is far out and then paddle off in little boats to a group of rocks some distance from the shore. These rocks are covered with a certain species of small mollusks, *Aplysia depilans*, clinging fast to the rocks. The men quickly pry off and blow into the little shells, whereupon a milky, acrid, and ill-smelling fluid exudes from the animal. When they have collected enough of this fluid the thread is thoroughly wet with it and left in a sunny place on the beach to dry, subsequently being washed with soap and water, when it turns into a beautiful and permanent violet color. The Indians insist that this process keeps the thread from rotting. The men are very gentle in handling these shells, carefully replacing them on the rocks after their work is done. This mollusk is closely related to the *Lepus marinus* of the ancients, which history tells us furnished the purple of vaunted Tyre.

My hostess next took us into her kitchen and showed us her bake oven, which looked more like an Eskimo hut than anything I can think of. It was very large, all of four and a half feet high, round, and made of clay, with a large door in one side. A spotted pig with an inquiring turn of mind kept close to my heels during my stay in the kitchen, and two brown hens pecked around as if very much at home.

The parlor came next, a very neat, well-kept room, and one in which our hostess evidently took much pride. There was an upholstered sofa and two chairs, an elaborate "what-not" in the corner, covered with fancy fans and gay colored picture cards, and two or three ordinary cane-bottomed chairs. We sat down here while she showed a number of native ball costumes. These are very elaborate, especially the skirts, which are either of brocaded velvet or of plush, often with very intricate patterns of embroidery and beads. These skirts are all made in one style, very scanty, and gathered on to a band for the waist. Without exception they are finished at the foot with a pleated ruffle of stiffly starched white cotton lace about 10 inches wide. These costumes seem to be peculiar to Tehuantepec, and, though seen sometimes at Salina Cruz and San Geronimo, are only worn by the Tehuanas.

MARKS OF AN OLDER CIVILIZATION

There are many points of interest to be seen round about Tehuantepec. In a northeasterly direction, about three miles from the town of San Geronimo, is a curious painted rock standing straight up from the sloping side of the Cerro de Ixtaltepec. It is covered with quaint figures and hieroglyphics painted in red, and, though very old, these figures are still quite distinct. It is thought by some to have been a treaty rock, probably settling some dispute between two tribes in the days before the conquest. The Indians do not like to go near the rock, fearing the evil spirits that abound there. Several bright red crosses have been painted over the figures in recent years, evidently work done by the padres to drive the devils away.

A number of ruins, silent evidences of a once vast and powerful people, have been brought to light from time to time. One, a very interesting study, the mountain of Guihengola, whose summit is covered with ruins, lies about five leagues to the west of the town of Tehuantepec.

Near the summit of one of the limestone spurs of this mountain is a cave, sloping downward, with several large rooms and passages from one to the other. After a hard climb to the summit a large valley about two miles long is reached. In this valley, surrounded by a massive crumbling wall about 12 feet wide, is a large oblong structure, supposedly a temple, built of small flat stones and lime. It is 33 feet high, 90 by 105

feet at the base, and at the top 75 feet by 60 feet. Four terraces, built one above the other at a distance of six and a half feet, surround the structure. Narrow flights of steps run up to the top at each end and one wide flight in the center. This temple is believed to have been built for offering up sacrifices.

Across the valley, and directly opposite, is another and similar temple, but larger, and with houses built on top. To the south of this is another large mass of ruins, surrounded by a high wall and the ground paved with stones. The natives are full of superstitions concerning these mountains, but tradition has it that the inhabitants of Guihengola were driven away 300 years ago.

Many other remnants of an older civilization can be observed on the isthmus, where today the blending of ancient customs and semi-civilized natives with twentieth-century progress and hustle is very curious to observe.

HEWERS OF STONE

By Jeremiah Zimmerman, D.D., LL.D.

THE ruins of Mitla are the most beautiful, the most interesting, and best preserved ruins in the Republic of Mexico, although they are not the most extensive. Years before the conveniences of modern travel, explorers were attracted to them, so that the world has become somewhat familiar with these unique and remarkable structures. It is partly due to their marked distinctive character, their isolation in the solitude of the remote end of the valley, bounded by the mountains, and owing to the utter lack of information as to their origin, so far as their builders are concerned, and the time of their construction that travelers have been tempted to indulge in extravagant language when referring to the Mitlan ruins.

The extensive mural decorations of mosaic fretwork is almost as perfect as when finished, many centuries ago; but there is no written language there, no inscriptions that shed light on these unknown problems, for all is as mute as the Sphinx of Egypt, and even the records that the ancient race transmitted to their posterity, and which would be of incalculable value to us, were utterly destroyed, with few exceptions, by their conquerors as being the works of the devil who unfortunately has been made responsible for too many human, and also inhuman, shortcomings, as well as the scapegoat for some of the worst crimes of history.

In this article I shall endeavor to give a description of these wonderful ruins, based upon personal observation and the information gained from that able and painstaking explorer, William H. Holmes.

Most of the difficulties that once prevented the ordinary traveler from visiting Mitla have been overcome by the extraordinary progress in transportation, for now we can ride in a rather comfortable train, and even in a parlor car, to within 30 miles of the ruins, and the chief engineer of the Southern Railroad informed me that a branch road had been contemplated and would soon be constructed as far as Mitla. The railroad traverses a section of country that has many attractions, descending from the altitude of more than 7,000 feet at Puebla until it reaches a point where the bed of the road is only 1,768 feet above sea-level, where for several hours we run through the great canyon.

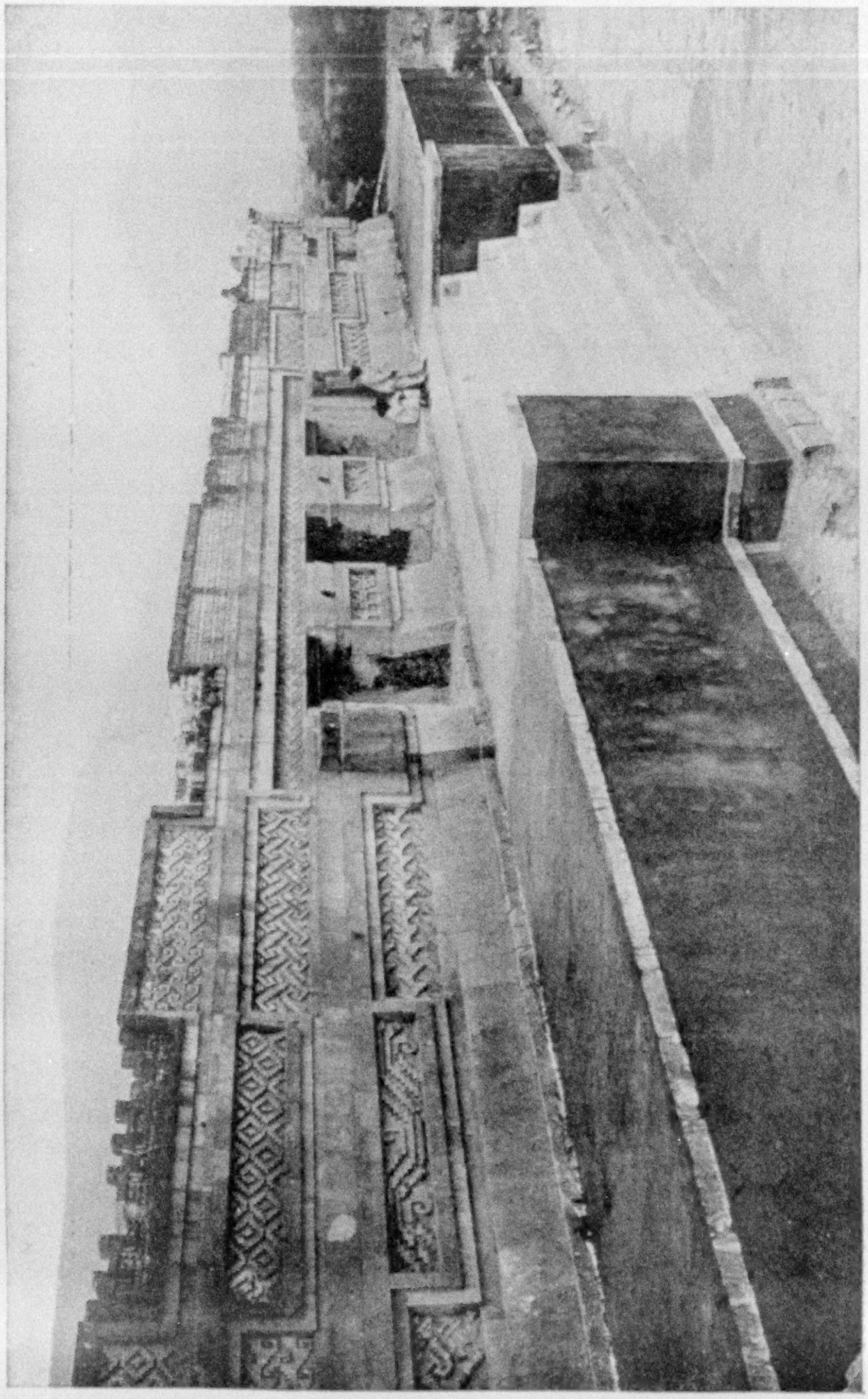
A GORGEOUS LANDSCAPE

There are features in the picturesque scenery above the road that make a lasting impression, and as memory takes us back I see again the mountains standing out in imposing grandeur, the rocky

Photo from Mrs H. Olsson-Seffer

TYPICAL ZAPOTECA WOMAN WITH THE PECULIAR HEAD-DRESS

Note the pendant on the necklace (see page 998)



MAIN ENTRANCE TO THE PALACE OF MOSAICS, MITLA (SEE PAGE 1015)

cliffs and sides streaked with the effective colors and tints that finally shaded and melted away with the native gray stone—a gorgeous landscape that nature had wrought without paint or brush, but produced by the imbedded minerals or native pigments that through the ages have slowly exuded from these castellated mountain palisades, and which remain unfading through the centuries, though exposed to the elements, not on perishable canvas, but on the everlasting mountain slope, the wonder of every beholder. Long after distance made them fade from view we realized that the mental impression was not gone, and in the gallery or chamber of imagery I often seem to behold again that enchanting masterpiece of nature's painting.

As we continued some hours southward we experienced a great change in the temperature, for we had descended rapidly from the high tableland and were passing through the canyon, and the narrow course was bounded by the lofty rocky barriers that excluded the air and seemed to attract and hold the heat. We all perspired freely, with the thermometer climbing to 115° Fahrenheit in the shade, and yet I have suffered far more from the heat at times in Syracuse with the thermometer confined to the eighties, for there is no humidity in Mexico, but the air is dry, and a physician told me that sunstrokes were unknown in that country.

OAXACA HAS MANY ATTRACTIONS

The rapid and diversified change of scenery, amid tropical plants, with that royally grand species of cactus known as the "organo," afforded constant diversion for the somewhat uncomfortable traveler. As we ascended again from the lowland to the plateau the temperature greatly improved, and before reaching Oaxaca we had reached an altitude of much more than 5,000 feet above sea-level and amid magnificent scenery. Again the road descends by gradual curves and soon we reach the city at the terminus of the line.

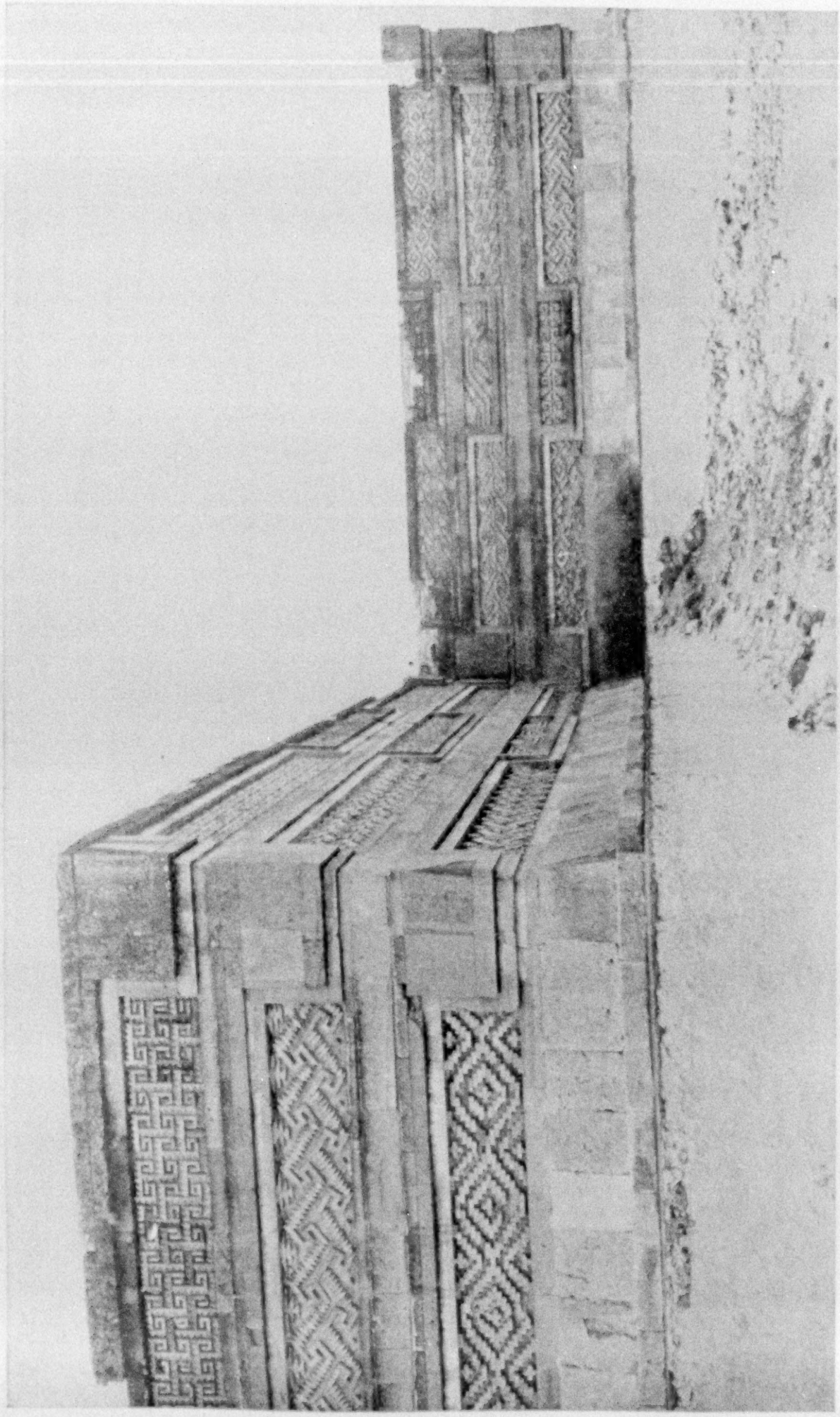
It is fortunate that the cities of Mexico are provided with street cars, for the cobblestone-paved streets are so rough that riding in a carriage, whilst it may be aristocratic, is anything but comfortable, and the poorest peon who occupies the cheapest seat in the very plain and unupholstered horse car suffers far less from the rough streets than the richest man who is jolted over the cobblestones when riding in style in his costly livery.

Oaxaca is a city of great interest and has many attractions that cannot be seen elsewhere. There are some famous churches, with unique and gorgeous decorations, and their resplendent designs of certain ecclesiastical wonders are a fascinating source of reflection for the student, who naturally seeks for a psychological reason for all this strange objective realism.

We found much in these leading churches that were worthy of repeated visits, but there are many other charming objects to be seen in this most interesting city, and the Museum, with its priceless treasures of antiquities from the aboriginal races of Mexico, I found to be of absorbing interest, for it was after all the most interesting and attractive place for me in all Oaxaca, and it is the center of attraction to every student of archeology and anthropology.

These remote people have long since passed away, but here at least is a tangible and visible connecting link, and we can study them in the light of their monumental remains. In many respects there are sermons in these stones, and as we reflect upon them we can read some of their thoughts and feelings, and even religious faith, as expressed in these rude and now often mysterious productions in clay and stone, but which were once altogether intelligible and which were so full of meaning to their cotemporaries.

In fact, these are their only surviving records, for the old Zapotecs and their Aztec conquerors who once inhabited this valley did not transmit to our generation a written history, with dictionary and grammar; and hence, as the sources of our information are so meager, the



ANOTHER VIEW OF THE PALACE OF MOSAICS AT MITLA, SHOWING THE ELABORATE EXTERIOR DECORATION

cotemporaneous works that have come down to us are all the more prized, even for the remotest suggestions of truth that they may contain concerning an extinct race that long ago had attained to a high degree of civilization, but whose origin and history are involved in so much uncertainty. All may easily repeat the same stereotyped questions that have been asked by the most earnest students of this science; but who can answer them?

It is true that in the market-place we may see some strikingly interesting specimens of the Zapotecan race, for these hardy, plump, bronzed Indian women are the lineal descendants, and, though centuries intervene, in many respects they are no improvement upon their remote ancestors, but have even retrograded, so far as personal ambition, enterprise, and achievement are concerned. Of course they have risen in the scale of civilization and are free from all barbaric practices, and are averse to warlike customs and would recoil with utter abhorrence from the shocking cannibalism involved in the worship of their forefathers. Perhaps even their physical resemblances are rather superficial and less marked than their contrasts, for the changed conditions and inevitable admixture of different races would cause a variation in the type.

THE DRIVE TO MITLA

We left Oaxaca at an early hour in the morning that we started for Mitla, in order to escape the rough carriage ride over the cobblestone streets. We took the trolley for several miles, as far as Tule, famous for the big tree, the largest of which I have any knowledge, with sufficient diameter for several stage coaches to drive through abreast if the center of the tree were hewn out, and there would still be wood enough on either side to support this mammoth giant of the flora kingdom.

It is a long drive, about 30 miles; but I had an excellent carriage, drawn by five horses well matched, and a much-traveled Englishman from Manchester, and with this interesting companion the way never seemed monotonous nor uncomfortable. In this I was agreeably surprised, for it had been described as beyond the endurance of the ordinary traveler, and many were deterred from undertaking the journey owing to these unfavorable reports.

I have often thought it would be a great relief to the traveling public if some of the chronic grumblers remained at home, or else were muzzled, for they do so much to disturb the peace of mind and to afflict the souls of others by telling of all the known evils that exist in the various cities you visit. In no part of the world during some years of travel did I meet such pronounced members of this class as when traveling through the Republic of Mexico. They never made the way natural and easy, but exceedingly difficult and dangerous by their tales of woe, and in every city they would tell you of the insanitary condition of the open sewers, of the smallpox that was raging, and how unsafe it was to take a street car or enter any church, store, or public place, and that severe colds and pneumonia were very prevalent, and that the latter was generally fatal for Americans, owing to the excessive altitude of nearly all the cities on the high tableland. I can imagine the terrible strain upon nervous people; and yet there is no escape from this thoughtless class, who, either from habit or limited interests, force this unsolicited information upon you. They would endure similar inconveniences of travel at home as a matter of course and without a word of complaint. They will race and endure clouds of dust when touring in the motor car at home, and all for pleasure, and call it fun; but to pass through a little dust in southern Mexico to see some of the interesting ruins of the world is too much for their endurance. In fact, they lack the enthusiasm of the genuine traveler and intelligent observer, and especially of the real student of mankind in the past, for some dust is inseparable from all archeological research, and the great explorers who

THE MONOLITHS IN THE HALL OF SIX COLUMNS, MITLA

These monoliths, like every stone in the buildings at Mitla, were cut out of the quarries and shaped by stone implements. The columns were used to support the roof to the court, the ceilings being made of beams of wood or slabs of stone. The roofs were filled with brush capped with rammed clay, similar to the method employed by the Pueblo Indians.

XUM

unearthed and brought to light the most interesting antiquities now treasured in the great museums of the world, and the many wonderful remains of the aboriginal races in this valley, and which now attract every visitor to the city of Mexico—these explorers went through, not merely days, but centuries of dust.

The drive itself is not uninteresting, for the long valley has some picturesque scenery, and at the primitive town of Tlacolula the journey was broken for a brief rest and light refreshments, and which prepared us for the remaining eight miles, which were soon covered. Here we reached the end of this beautiful valley, and about a mile from the base of the mountains that here rise on three sides, forming an amphitheater, is the site of ancient Mitla. According to Dr Seler it was the burial city of the Zapotec kings and priests, for it was the custom of these people, as well as of some of the kindred tribes, to bury their dead chiefs in caves, and the extensive caves in the mountains about may have led them to the choice of this site.

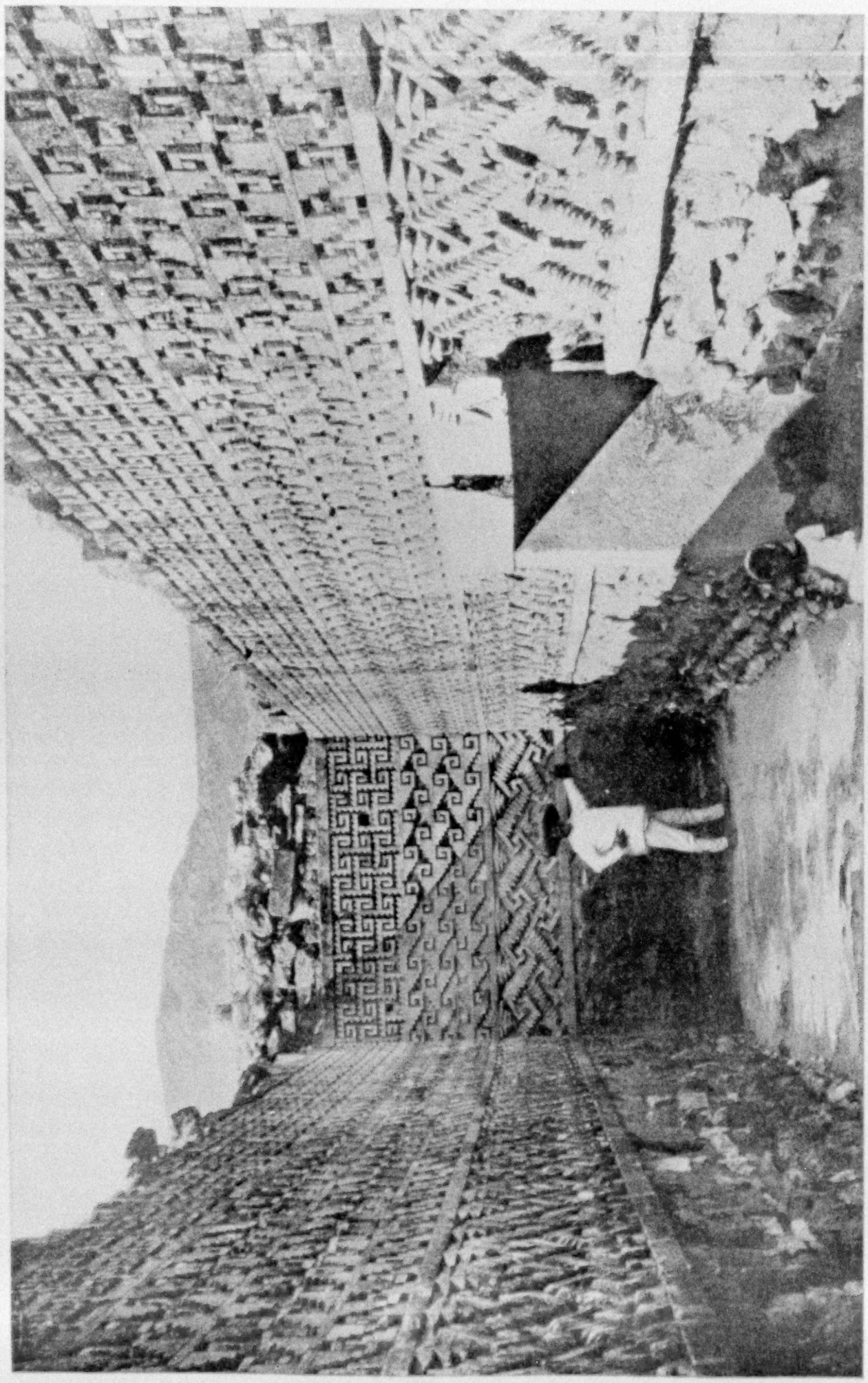
THE MARVELOUS RUINS AT MITLA

The insignificant and squalid village that we find here is in striking contrast with the civilization that reared these remarkable structures, although the inhabitants are said to be the descendants of the ancient Zapotecans.

Just why this location was chosen may be seen in its surroundings, the character of its mountain fastnesses, and its remoteness from other nations, and especially because of its water supply, the caves, and the abundant source of the choicest or most easily worked building materials.

Let us look upon these extensive ruins and study their architectural beauty, and then endeavor to transport ourselves into the distant past so as to become contemporary eye-witnesses of the workmen in the construction of these buildings. We must remember, when speaking of these ruins at Mitla, that they were built long after the stone in Europe had been superseded by the use of iron, for the Stone Age in Europe was probably several thousand years earlier than in Mexico. It would be a mistake, and we would fail in our full appreciation of these Mitlan ruins if in mind we were to transport these structures from the valley of Oaxaca to the valley of the Nile, or to Greece and Sicily, or to the colossal ruins of Rome and Baalbek, and then make the comparison with the great architectural achievements of the ancient Egyptians, Greeks, and Romans. Neither should we speak without reserve and qualification, as some are wont to do when indulging in most extravagant language, to express their admiration and wonder at what these races accomplished in Mexico, for these builders had their limitations. They would have builded far better had they been conversant with the architecture of Europe, and they would have made use of the arch and employed very different tools, but they used the knowledge and mechanical arts that they had, and when we keep this in mind we will be amazed at the wonderful works that they accomplished.

In fact, as we picture that age and the actual conditions of their civilization, it is difficult for us to understand how they built so well and reared structures that are still the admiration of the world. Whilst there are no contemporaneous records of the unknown builders to describe the character of their work and buildings, and how they cut the stones from the mountains and fashioned them in shape, fortunately modern explorers have discovered two quarries in the mountain, the one about three and the other six miles distant, where the ancient stone-cutters in great numbers once stood at their tedious and laborious work. There on the mountain range, without dynamite or any of our improved mechanical devices for tunneling or leveling the mountains, or cutting in form and polishing enormous blocks of granite, the swarthy Indian labored with the most primitive tools of the Stone Age, without steel chisel, hammers, and crowbars to overcome the resistance of



AN AUDIENCE-ROOM OPENING ON THE HALL OF THE SIX COLUMNS, SHOWN ON PAGE 1008

The builders did not use doors, but provided sockets beside the doorways for awnings. They were evidently not acquainted with the use of the arch, all doors in the buildings being surmounted by heavy blocks of stone, which weigh sometimes as much as 15 tons.

the softer material. No, he held in his hand a stone hammer, axe, or chisel, though harder than the particular rock from which he obtained his building material.

THE QUARRIES AT MITLA

We are enabled to reproduce the scene as we look upon the thousands of broken fragments and the many worn-out, broken, and rejected tools that still cover the native rocky floor of their once busy workshop, when hundreds of stone-cutters, speaking a strange language and urged on to diligent work by their masters, struck hard blows with rude hammers and axes before the native rock yielded and conformed to the necessary size and shape assigned for it in the building. The place recalls the quarry in the Lebanon Mountains, whence the colossal stones were taken for the temples at Baalbek. Of course, the Baalbek stones were greater in magnitude and the buildings were greater in height and of vaster proportions than those at Mitla, for in a wall 40 feet above the ground are three stones about 65 feet each in length and 15 feet in every other direction, whilst out in the quarry, one-half mile or more away from the temples of Baalbek, we saw a fourth stone of the same size, and almost detached from the mountain with the exception of the lower angle. These enormous hewn stones were much larger than the largest ones used in the wall around Jerusalem or in the great pyramid of Egypt. But these were different workmen who went into the Lebanon Mountains, and they had very different tools, that made the hardest granite and porphyry yield to their stroke.

While the workmen in the quarries near Mitla were restricted to stone implements, they were highly favored in the quality of the rock from which they quarried, for it was not hard granite, which would have rendered such achievements impossible, but a comparatively soft and easily cut stone of volcanic formation, and known as trachyte, but of sufficient hardness for building purposes. To have rock that was easy of cleavage and to cut into shape was of tremendous advantage to these Stone Age builders with their primitive tools, and no doubt they discovered the material before deciding upon the site of their capital. One thing is certain, however comparatively soft the native rock may have been, it has proved to be of superior quality for building purposes, for it is most durable, and even the many thousands of thin pieces that were split off have endured throughout the many centuries, and apparently have in no way suffered from the wear of time and the elements.

I would not leave the impression that the trachyte was of the same character as that singularly soft deposit found in certain places and which exists in great quantities near Palermo, and where huge blocks are cut out of the earth according to the required size for the building. A great area had been excavated, for many of the large buildings in the city had been constructed of the soft material taken from this place. It makes very cheap building material, for no time is required to hew and dress the stone, which is cut from the native bed at once into the size wanted, just as you would cut a slice of cheese, although it is much softer, more like clay. To make the test for myself, with one stroke I easily sank the axe six inches or up to the handle. Yet the stone becomes very hard when exposed to the air and is most durable, for there are no signs of crumbling or scaling off from the buildings after the centuries of wear. Such a deposit is a gold mine for architects today, and the early Mitlans would have been most fortunate had they discovered such material in their valley.

But they had a very different problem to solve, for their material had to be cut from the mountain, and this required an enormous expenditure of time and energy, for the substance was volcanic rock, and after detaching huge blocks there were great difficulties involved in getting them down to the valley, for the quarry was 1,000 feet above the plain,

and then they had to draw them some miles farther to their place in the building. It would not be a difficult feat of mechanical engineering today, with our improved conditions, but we must consider the real difficulties as they actually existed among that primitive people. On the other hand, they had an abundance of time, and labor was cheap, and in a despotic age all the workmen necessary could be pressed into service.

SOME OF THE BLOCKS WERE ENORMOUS

Enough remains in the quarries to enable us to understand their methods. In blocks still *in situ* we may see the process of leveling the upper surface of a huge portion of rock, and then cutting channels on the four sides to form a parallelogram, and next followed the under cuttings from each end, for there are blocks just as the stone-cutters left them after having under-cut away two-thirds of the block. Likely they meant to detach it by means of driving wooden wedges under the separated ends and then soaking them with water, and, possibly, hastening the process by means of a heavy lever.

We can scarcely imagine the amount of labor necessary to cut the stones for the Mitlan buildings, with nothing but rude stone tools, especially as many of these stones were tons in weight. It was a most laborious task, for the workmen had often to take many uncomfortable attitudes, and there were cramped backs and wearied arms and bruised hands.

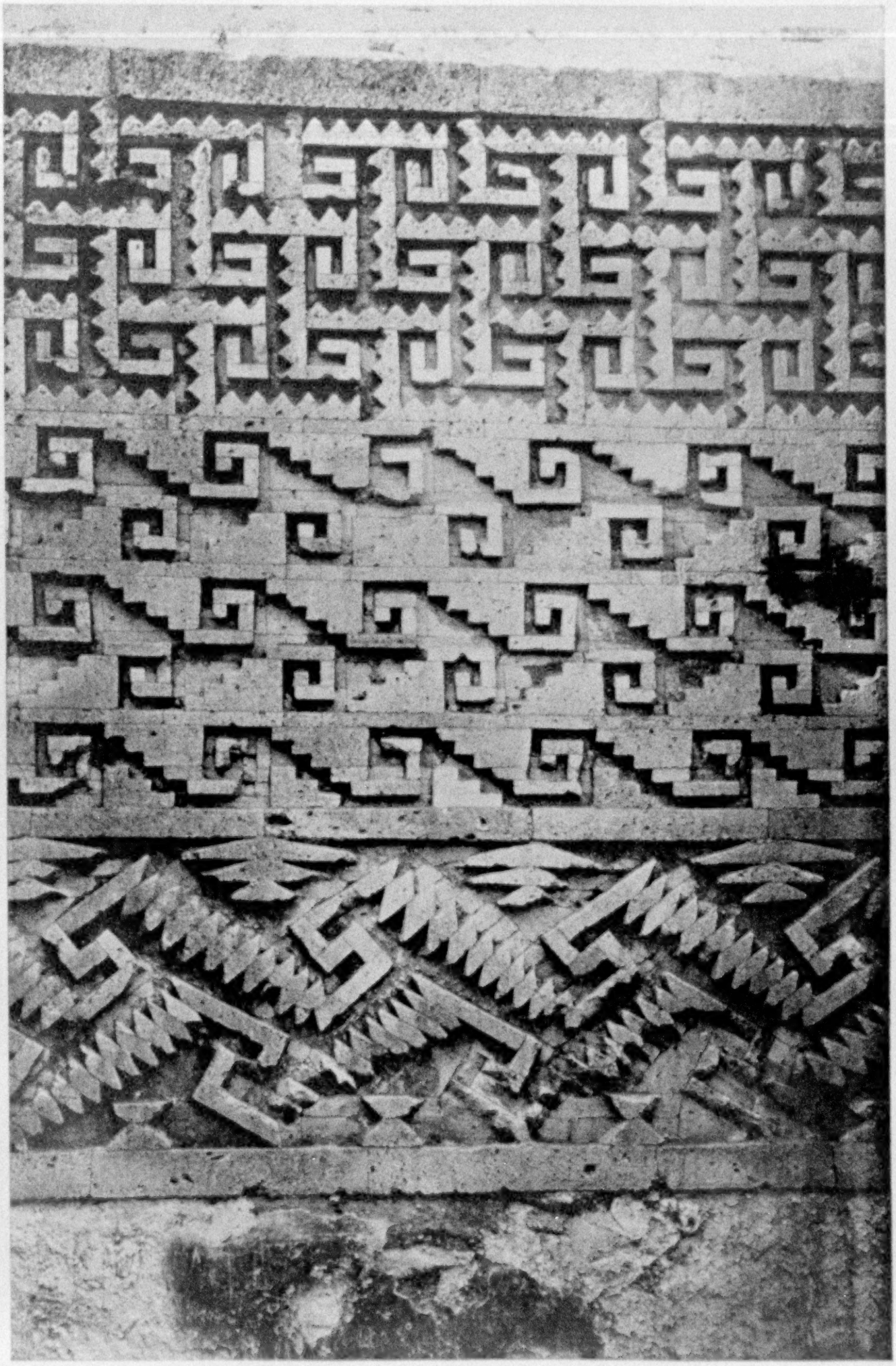
Some of the stones were of enormous size, such as the lintels, some being 20 feet in length and 4½ feet in each of the other dimensions and weighing as many as 15 tons, while the monolith columns were nearly 15 feet in length and weighed as much as eight tons. There were two heavy jambs required for each doorway, besides the sill or bottom stone, and what consummate patience and perseverance were required to provide all this building material, notwithstanding the peculiarly tractable character of the volcanic trachyte. Some 50 lintel stones remain, varying in length from 10 to 20 feet, but the original number was much greater.

THEY HAD STONE IMPLEMENTS ONLY

Holmes estimates that there were as many as 1,500 wooden beams in all the different groups of buildings as originally constructed. What infinite patience was required for these hewers of wood with stone axes. Without steel or iron, they cut the trees in the forest as best they could, and then cut them again into the required length for beams to support the flat roof.

With all our mechanical skill today, it would be child's play for our architects to rear such one-story structures as those at Mitla, for our age builds skyscrapers and tunnels and runs passenger trains through the mountains and to the summit of the Alps and under great rivers; mounts up on high and soars through space, and dispatches messages through the air to friends far away at sea, achieving wonders that the builders of Mitla never dreamed of; and we must not speak of their architectural triumphs as rivaling ours; for while it was remarkable for them in the Stone Age, and hence of great interest to us, there would be no difficulty in our duplicating it, and even greatly improving it. Therefore, we must not look at it merely in comparison with the greatest architectural achievements of ancient and modern times, but from their own standpoint, in the light of their civilization and knowledge of the mechanical arts and the character of the tools they had to work with. When we consider the conditions under which they labored, we are amazed at what they accomplished, and their triumph in architecture in the face of seeming insurmountable difficulties.

How did they cut down the trees and hew them into shape with their rude tools? Had they lived in the Iron Age and possessed steel axes, saws, planes, and chisels, our wonder would not be so great; but they lived in the Stone Age, and yet with all the serious limitations



FRETWORK MOSAIC AT MITLA, IN THE PALACE OF MOSAICS

The stone slabs or tiles are about one inch thick. It is estimated that more than one million of these stones were used in decorating the buildings at Mitla. When we realize that each stone was cut out of the quarry, not with steel or iron implements, but by stone hatchets and stone tools, the infinite labor and pains required for this form of decoration can be appreciated.

ONE OF THE LARGER TEMPLES OR PALACES AT MITLA

All the buildings in this wonderful group, excepting that containing the Hall of Six Columns, shown on pages 1004, 1006, and 1008, contain only a single long and narrow room with thick walls but one story in height. The stone blocks, though weighing sometimes as much as 15 tons, were cut out of the quarry with their hatchets of stone with such precision that very little mortar was required for the joints.

they produced a most wonderful group of buildings.

The great Hall of Six Columns is 125 feet long by 23 feet wide. These columns are about 11 feet above the floor and probably several feet beneath, and measure 3 feet in diameter at the base, tapering slightly toward the top. They are monoliths with a smooth surface and weigh from six to eight tons each. As the width of the hall was too great for the span of the flat roof, these columns were placed in the center to support the wooden beams upon which they laid the ceiling and roof, and hence this structure was very low as compared with modern public buildings. The row of columns was not intended for architectural beauty, but for a necessary support wherever the width of the room exceeded 12 feet. Some of the ceilings were formed of stone slabs, but when the width or span exceeded 6 feet, then wooden beams were employed.

THE MOSAIC FRETWORK

Every visitor to these celebrated ruins is impressed with at least one feature of originality, whereby those architects produced a wonder-effect in mural decoration by means of the mosaic fretwork. As we look upon this unique feature we may well ask whence came the suggestion or knowledge that led to this particular style of decorative work that we see on the interior walls of the rooms in the buildings at Mitla. Other buildings with similar mosaic fretwork have been discovered in several places in the country of the Zapotecs erected by the same native people; but whence did they derive their knowledge, or was it an original product or development?

Among all the architectural remains that I have seen in any country of the ancients, there is nothing that bears any resemblance to the distinctive character of this decorative work and which could have suggested it.

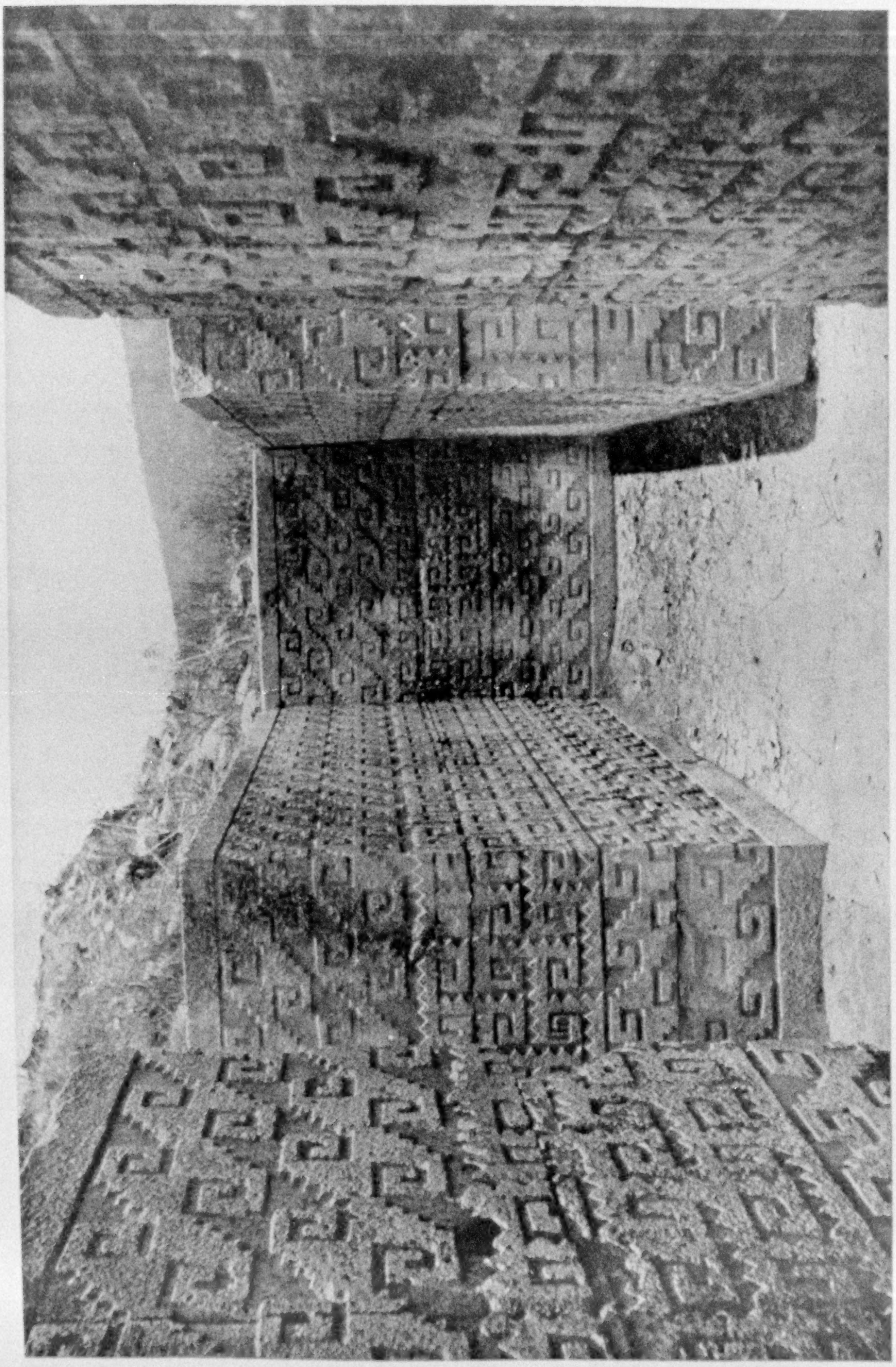
The stones composing the mosaic designs are not the small bits such as characterize the pieces that were employed in Europe, but they are rather stone tiles cut in different size and form for their particular place in the decoration, and generally from one to one and a half inches in thickness and resembling the thin bricks used in the buildings of ancient Rome.

The great quadrangle or court of grecques is 30 feet square and the walls are about 13 feet high. In addition to the doorway by which we enter as we come from the passage leading from the Hall of Six Columns, there are four other doors opening from each side wall into the four narrow halls that are parallel to the sides of the quadrangle, but of unequal sizes. It is uncertain what use was made of these narrow chambers, but they may have answered for sleeping apartments, for in those days sleeping quarters were limited in size and not the large, comfortable rooms of modern times, and where some spend most of their lives. The buildings at Mitla have no windows, the only light and air for the chambers coming from the large inner hall or quadrangle.

While the four halls that surround the quadrangle are so narrow, not more than seven feet in width, the massive walls between them and the inner court are six and one-half feet in thickness.

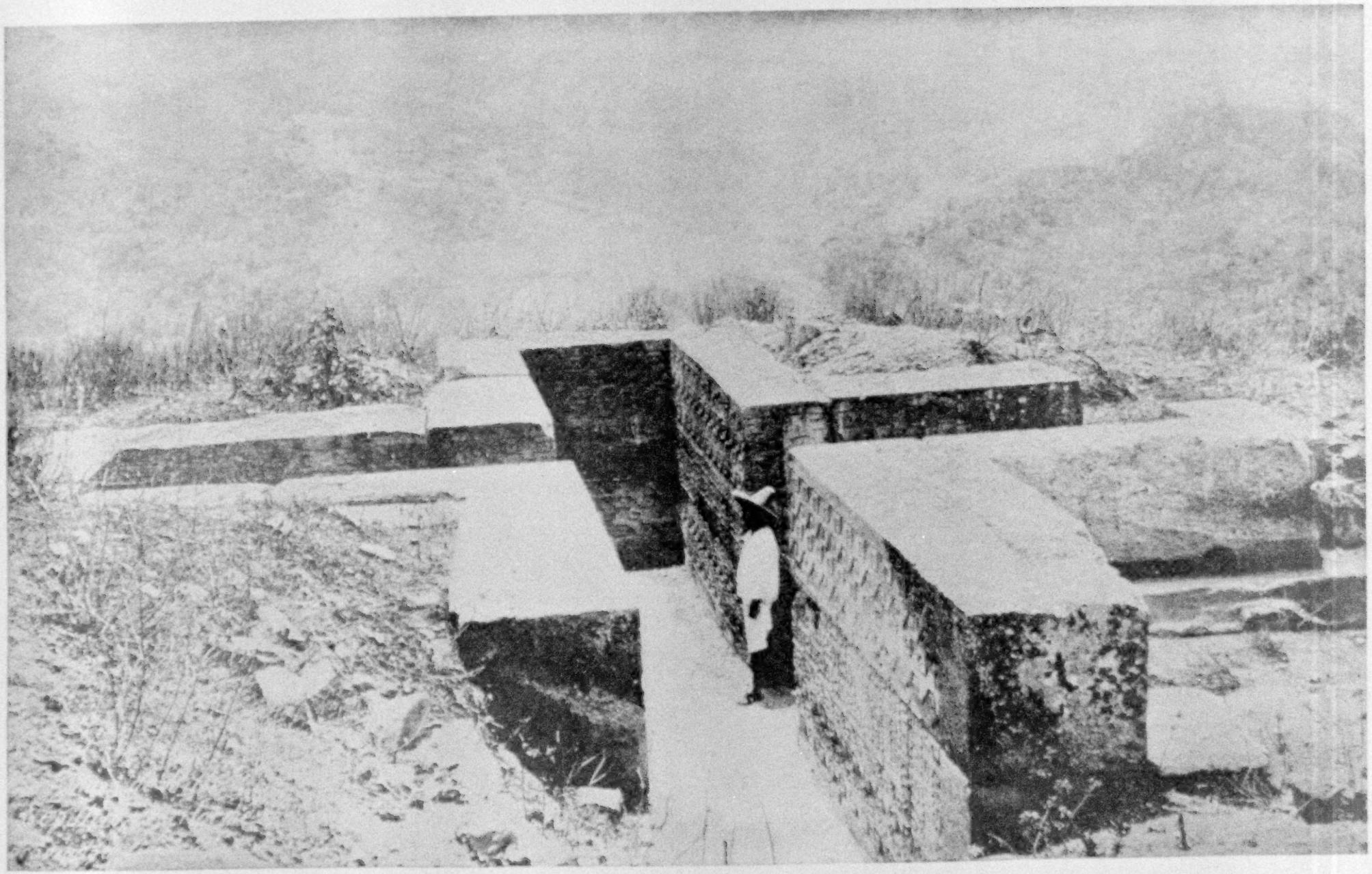
There seems to be no reason for having such a thick inner wall, for it was not for defense, and, in addition to occupying valuable space, it required many months of extra labor to cut and transport the extra stone required. The builders have given us no explanation and we are left to the uncertainty of conjecture.

Of course, in view of their lack of knowledge respecting the use of the arch, it was impossible for them to extend the mosaic decorative work over the doorway, for they were obliged to place the large lintel there instead, some of these weighing as many as 15 tons; but they were equal to the emergency, and, in order to preserve the uniform harmony of the geometric design in the mural ornamentation, they sculptured the stone lintel with the very same grecque design as the mosaic fretwork, so as to har-



THE CRUCIFORM CHAMBER CELLAR AT MITLA

The builders were very skillful in carving intricate designs on stone blocks, notwithstanding that their only tools were made of stone



CRUCIFORM GRAVE NEAR MITLA

Photo from Mrs Harriet Chalmers Adams

Several of these cruciform cellars have been discovered at or in the vicinity of Mitla. They probably were the sepulchres of important priests or nobles. On a hill about a mile from Mitla there are some fortifications, probably built by the same people, which in massiveness and skill compare with the ancient fortifications of Peru. Piles of rounded stones remaining on the walls show that slingers were a formidable means of defense in those days.

Photo from Russell Hastings Millward

THE TORTURE OF GUATEMOTZIN, THE LAST AZTEC EMPEROR OF MEXICO, BY CORTÉS

When his companion complains that he is being tortured beyond endurance by the fire, Guatemotzin replies, "Am I on a bed of roses?"

monize with the other portions of the walls.

EXQUISITE CARVINGS

What impressed me as most remarkable was the skill with which they carved the design into the heavy stone lintels. There was an exactness and finish in details such as we would expect from stone masons with iron hammers and chisels of steel instead of the primitive stone tools. As I reflected upon this fact the question forced itself upon me, Why did they not build or face the walls entirely of large dressed stones and then carve the entire surface with the same grecque design, and which in part they were compelled to do in the treatment of the lintel? It is true the effect would not have been as pronounced as the bold relief appearance which was obtained by the countless pieces that made up the mosaic fretwork. It might have involved even greater labor to have cut and transported the large blocks of stone from the mountain and carved out the design by means of stone tools, for they had to sculpture as many as 50 lintels, and they had no doubt learned from experience the wisdom of building just as they did.

To appreciate the prodigious labor involved, one need but estimate the number of thin brick-shaped stones employed in the mosaic work of the quadrangle of grecques alone, for they exceed 50,000. The various buildings grouped about it would have contained as many as 130,000, and it has been estimated that probably one million of these were used in the mural ornamentation of all the buildings at Mitla. The patience of the workmen must often have been tried when the almost finished bit was broken by a blow of the pick.

Father Burgoa, who saw these buildings at the time of the Spanish conquest, and when they were in far better preservation than today, has left us an interesting and valuable description, although not strictly accurate in every particular. He says, among other things, that "the palace of the living and the dead was built for the use of this one (high priest of the Zapotecs). They built this magnificent house or pantheon in the shape of a rectangle, with portions rising above the earth and portions built down into the earth." Referring to the stone columns, he states that they "are wonderfully regular and smooth. These served to support the roof, which consists of stone slabs instead of beams. But in the construction of the walls the greatest architects of the earth have been surpassed."

The Zapotecans also displayed wonderful skill in the art of painting, and, while unfortunately nearly all of it has been destroyed, yet in the examples that remain we recognize a mastery in painting that is as great a surprise as their mosaic fretwork. It is remarkable how perfect the colors remain to this day, after having been exposed to the elements for many centuries, the surface being still as smooth as polished marble. Although the figures are grotesque, according to their conception of the story which they intended to illustrate, nevertheless the surpassing coloring, the finished detail, and the general artistic effect show the presence of a master of the art.

There arises another question: Why did they not leave some sculptured figures? With such a mastery in the art of painting, and with the evidence of their skill in carrying out the grecque designs in the stone lintels, there can be no reasonable doubt as to their ability to sculpture statues of their heroes and gods; but for some reason they do not seem to have added this art to the ornamentations of their wonderful buildings at Mitla.

Photo from Russell Hastings Millward

FOWL-SELLERS IN MEXICO

Note the turkeys, which are the indigenous variety found in Mexico

AGRICULTURAL POSSIBILITIES IN TROPICAL MEXICO

By Dr. Pehr Olsson-Seffer

Late Commissioner of Tropical Agriculture to the Mexican Government

FEW countries offer better natural advantages for successful agricultural operations than the Republic of Mexico. It is true that the highlands are depending on artificial irrigation to produce abundant crops, but in the tropics of Mexico there is water enough. The rainfall varies from 80 to 175 inches, well distributed for agricultural purposes.

On the highlands the forests have been destroyed in times gone by, and devastating floods often occur; but in the "hot country," with immense primeval forests still standing, such floods are mitigated and the precipitation is absorbed by the soil to the benefit of the vegetation.

The native Indian method of corn culture in tropical Mexico does not greatly differ from agricultural practice in many other countries. The "chena" cultivation of the inhabitants of East India, the "svedjebruk" method of the early Scandinavians, the "kaski" in Finland, the "sartage" of France, and the burning off of a hillside for a "milpa," or patch of corn, in tropical Mexico are essentially similar. They are equally de-

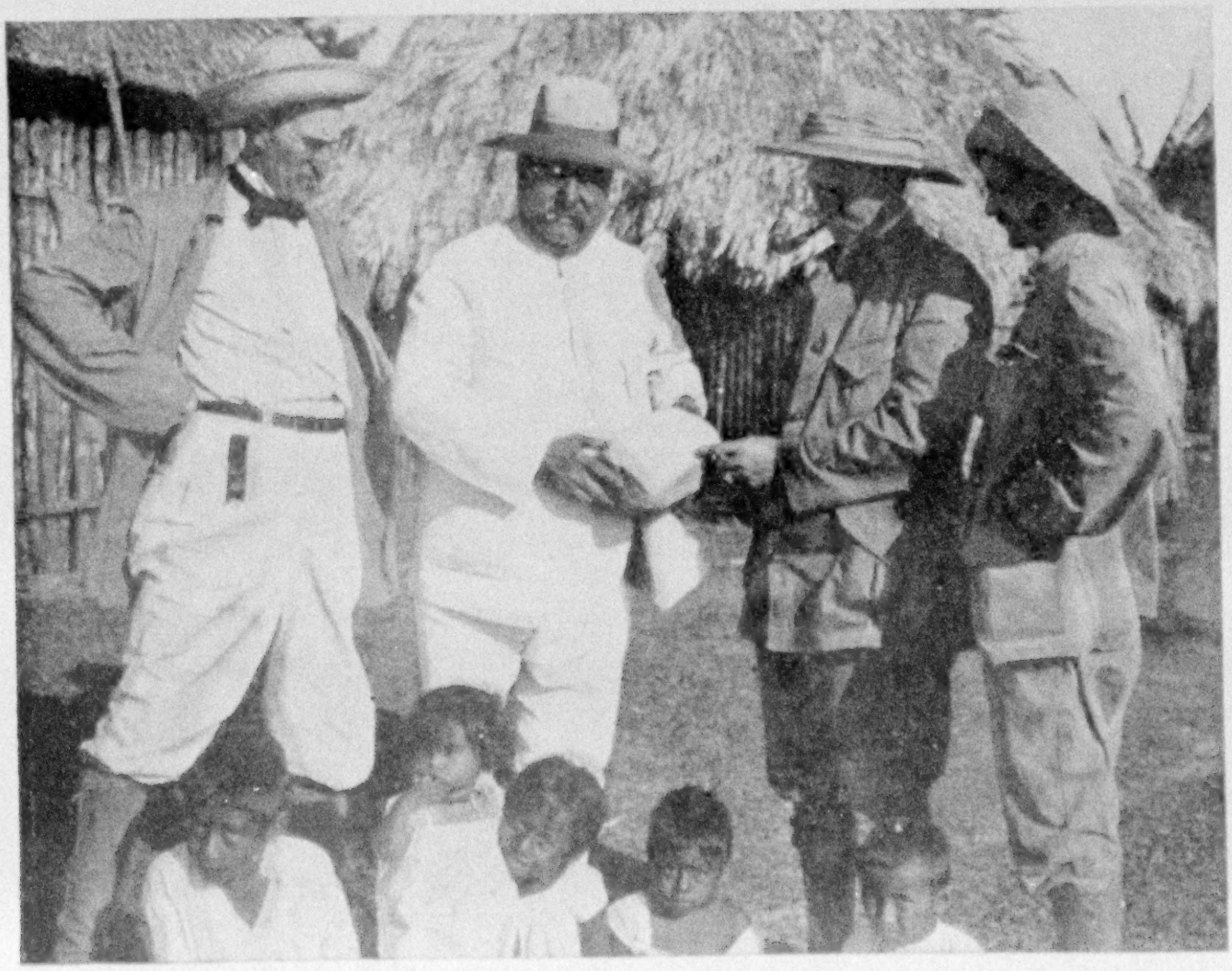
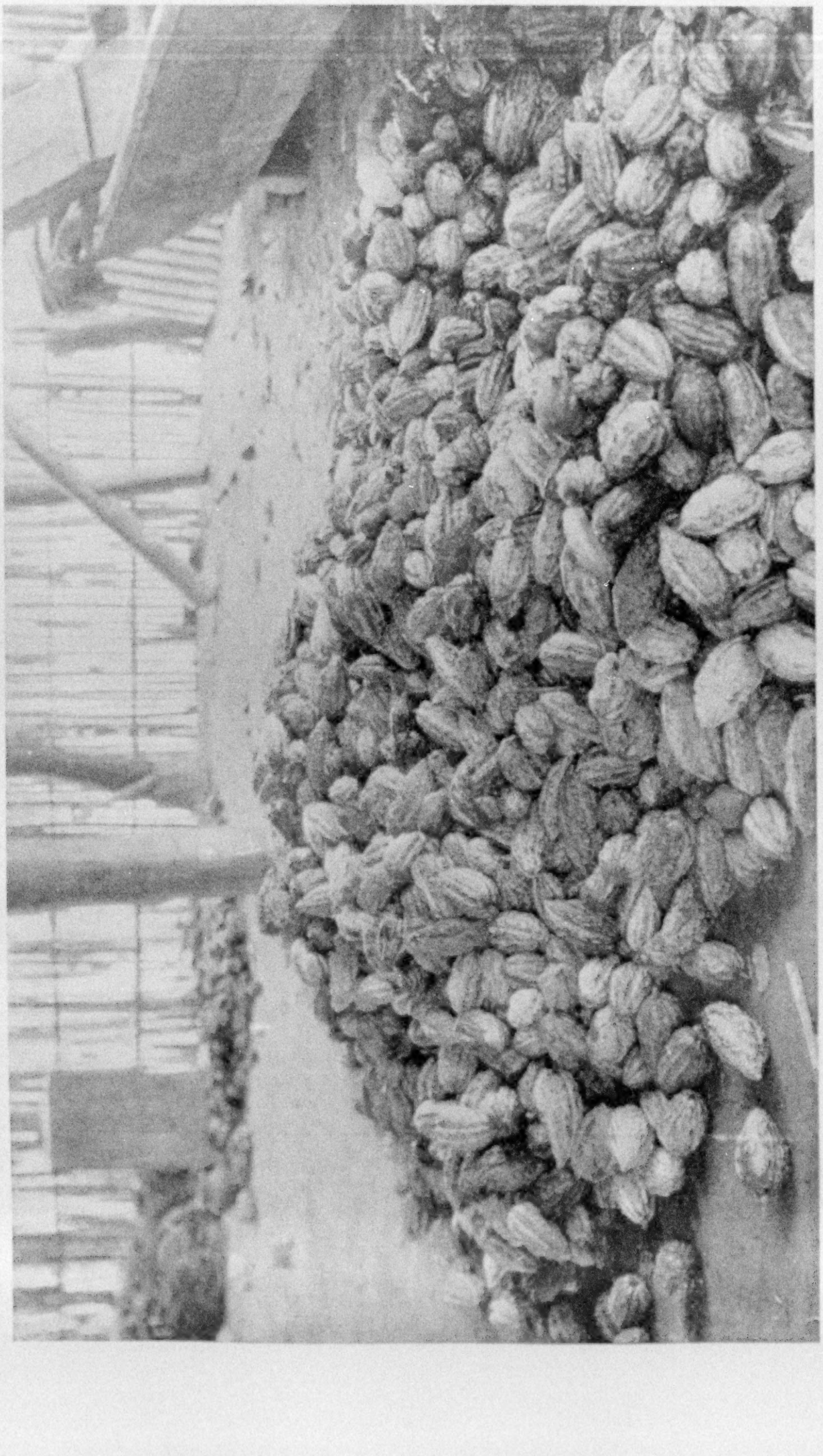


Photo by T. F. Lee

INSPECTING CHICLE, THE BASIS OF CHEWING GUM, IN YUCATAN, MEXICO



CACAO, OR CHOCOLATE PODS, READY FOR SHELLING; TABASCO, MEXICO

Photo by Waite

Photo from Russell Hastings Millward

CACAO, OR CHOCOLATE, GROWING IN TABASCO, MEXICO

NATIVE BRICK MANUFACTURERS

The construction in this part of Mexico is, almost without exception, of brick

structive to the forest, equally ruinous to the soil. The attention of the Mexican government has been drawn to this wasteful system, which leads to the impoverishing of the people and the destruction of much valuable land.

Taken as a whole, the Mexican tropics are unusually fertile. Notwithstanding the primitive methods in vogue, the people are able to live easily. The land is capable of producing everything necessary for life, but only comparatively few products are as yet cultivated.

Detailed examinations of the soil conditions and other natural advantages in many parts of the Mexican tropics have given definite evidence of the possibilities of the country. Where there are now a few native villages, whose inhabitants are eking out a scant living, there should be large plantations and prosperous small yeoman farms. Instead of a population of a few millions in the tropical part of the country at the present time, it could support 40,000,000 people. Where there are now some $250,000,000 invested in tropical industries, $75,000,000 of which is American capital, there is room for four and five times that amount.

The government of Mexico, being fully awake to the importance of the tropical southern country, is showing its interest in the planting of industries. Experiment stations are being inaugurated throughout the land, assistance is given to agricultural societies, and commissions are granted for various purposes to improve different industries. President Diaz' administration is favoring the agricultural industries to a very great extent.

The last decade has seen much American capital entering Mexico to engage in

LOADING BURROS WITH THEIR CARGOES OF BRICK

agricultural pursuits. Unfortunately this interest on the part of the American investor has given the conscienceless promoter an opportunity of which he has not hesitated to take advantage. That this has been to the detriment of legitimate undertakings is certain. However, the public has become wise, and is now better able to discern between honest and dishonest concerns.

Every country needs tropical dependencies. Whether these are political dependencies or not is immaterial to the subject under discussion. Every country situated in a temperate climate needs a large amount of tropical produce. Coffee, tea, cacao, sugar, spices, fruits, fibers, rubber, camphor, vegetable oils, condiments, drugs, tobacco, tropical cereals, such as rice, and various starch-producing plants, as arrowroot and cassava, are imported in great quantities to northern countries. The United States have wisely in recent years acquired some tropical dependencies, to which naturally capital from the home country is diverted. But the Philippines, Cuba, Porto Rico, and Hawaii, even if developed to their full capacity, are not sufficient to supply the United States with the colonial produce needed.

American capital has therefore become interested in the production of many other countries, and principally so in those close at her door—Mexico and Central America. As tropical agriculture has proved a profitable undertaking, it is only natural that capital should turn towards these countries and towards agricultural investments. This desire for investments in the American tropics is becoming more and more evident, and Mexico is now getting her share of this outflow of capital.

THE COFFEE INDUSTRY IN MEXICO

Although the competition with Brazil is keenly felt by coffee planters throughout Mexico and Central America, coffee-growing has not decreased as an industry in Mexico. This fact is ascribed to the superior quality of most of the Mexican coffees, which can find a good market despite the reduction in price of coffees from other countries.

Coffee in Mexico is generally grown at an elevation of 2,000 to 5,000 feet. In certain districts the coffee plantations are

situated below 1,000 feet, but it is a recognized fact that coffee grown at such low elevations is inferior in quality. The only redeeming feature is that the quantity produced is so much greater, which compensates the planter for the lacking flavor and consequent lower price.

Under the present conditions of the world's coffee market, it is not very likely that the area under coffee in Mexico will be greatly increased. One of the most important factors in coffee culture is the supply and price of labor. A coffee planter needs his laborers only during a certain part of the year, and he then requires cheap labor for the picking of his crop. Labor in Mexico is becoming expensive, and it is, moreover, very scarce. By expensive labor on plantations is meant labor that is paid 50 cents per day, which generally is considered too high for crops such as coffee.

CACAO, THE FOOD OF THE GODS

In olden times much more cacao was grown in Mexico than at present. The Aztecs prized cacao very highly, and beans of this tree were used as money until the time of the conquest, when gold became the means of exchange.

Cacao has been grown in Mexico, especially in the State of Tabasco and in the Soconusco district in Chiapas. So well known were the productions of these parts of Mexico that two kinds of cacao became world renowned under the names of tabasco and soconusco. In Chile and Peru cacao is still named soconusco, and it is a mark of honor to be invited to a cup of "soconusco." This Soconusco cacao was sent to the King of Spain among the contributions from the viceroyalty of Mexico. Until some 30 years ago Soconusco cacao retained its name for superiority and regularly occurred in the market. Today a very small quantity only is grown in that district, and the total production is consumed locally.

The reason for the discontinuance of cacao cultivation in Soconusco was mainly the indifference and indolence of the natives. The district was opened up and opportunities for making a living became more varied. The native does not care to bother when he can make sufficient for himself and family by working two or three days of the seven in the week.

In recent years the culture of cacao has been stimulated by the high prices of this product. Several foreign companies and individual planters have begun to devote attention to this crop, which promises to become one of the most profitable products of the soil, although it takes some six or seven years until a full crop is obtained after planting.

TEA-GROWING

This industry has as yet made no headway in Mexico. One or two American companies have gone into this kind of planting, but their example has not been followed. The main reason of this indifference is probably the general prevailing ignorance of the subject of tea-planting.

Experiments and investigations of the conditions for tea-growing in Mexico have shown that an excellent quality of tea can be grown in many districts. The planters in Ceylon, India, and Java, as well as the native farmers of Japan, Formosa, and China, are making a good thing of their tea gardens, and there is no reason why considerable areas in Mexico should not be put under this crop.

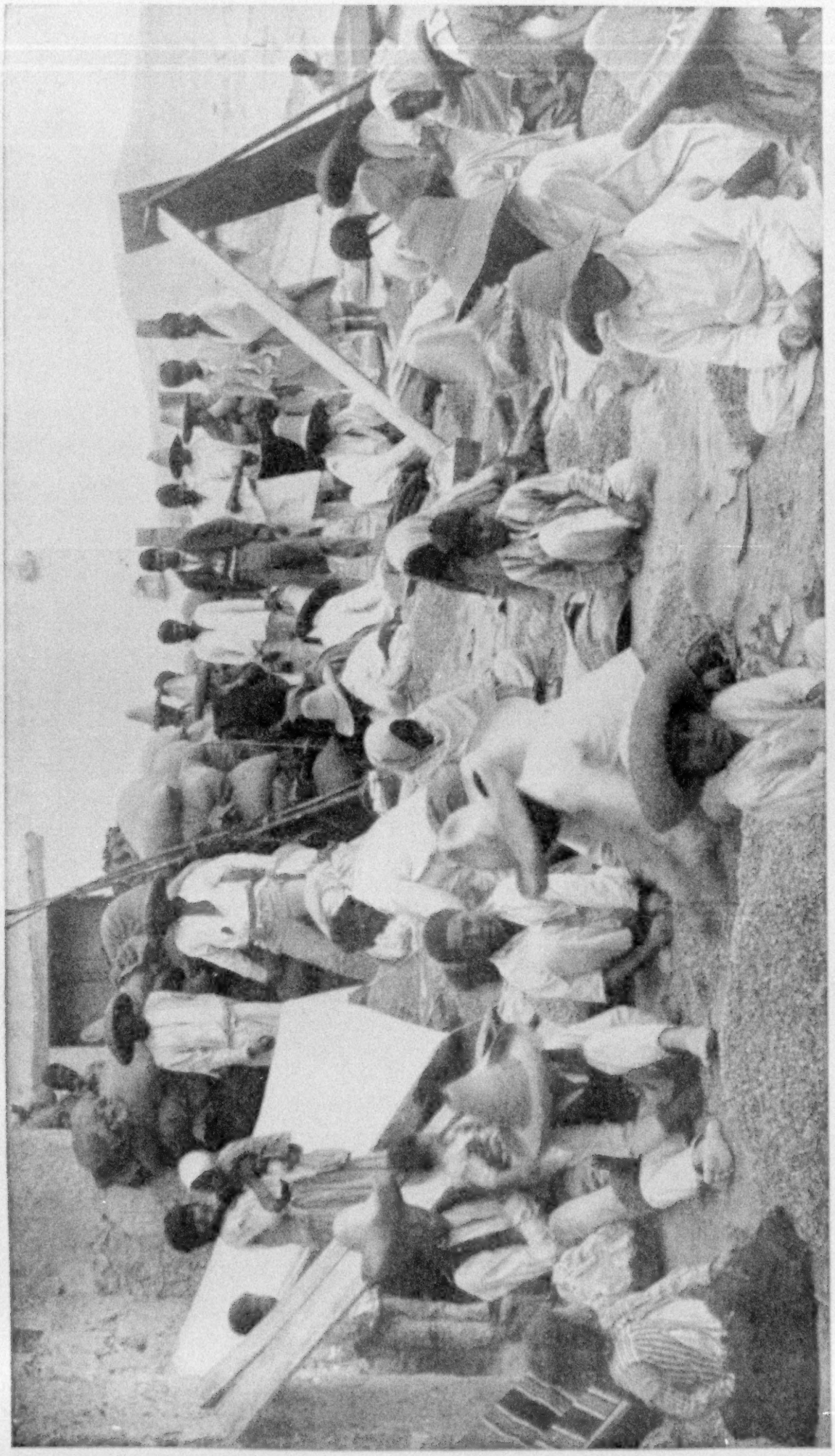
The consumption of tea in America is considerable, and with an open and good market at their very doors, Mexican planters should realize their opportunity in this regard.

SUGAR-CANE

The sugar industry in Mexico dates back to prehistoric times. Different sweetmeats have always been in great favor with the natives of the country, and they were made from the home-made "panela" sugar, which is still being manufactured in the tropics of Mexico in the old primitive way, by grinding the cane between upright wooden cylinders drawn by a team of oxen, and boiling the sugar in large open pans.

Very few improvements are applied by

A LUXURIOUS VANILLA VINE: THE LONG FLESHY PODS MAY BE DISTINCTLY SEEN



SORTING BEANS IN MEXICO

Photo from Russell Hastings Millward

the natives themselves, but on the large haciendas, owned by the descendants of the Spanish invaders, modern machinery is in use. Many foreign companies and capitalists have invested in sugar-cane properties, but it may generally be said that the sugar industry is not nearly in the high grade of development which characterizes the sugar plantations of, for instance, Hawaii.

Very little attention has been given to improvements of the varieties of cane grown, and it is not unusual to find large plantations of native cane low and thin and containing only a low percentage of sugar. The same land, if cultivated properly and planted with better varieties of cane, is capable of producing twice the amount of cane and nearly three times as much sugar.

In the milling methods many betterments could be effected. Very few Mexican sugar mills employ a chemist, and with the rule of the thumb system employed much is lost in the manufacturing process.

Certain parts of tropical Mexico have excellent soil for sugar culture. If proper modern methods of cultivation were adopted, fertilizers used, and an intelligent system of irrigation practiced, Mexico could double its sugar production from the area now under cane.

The total production of sugar in Mexico is only little more than the consumption within the country. The communications are good from Mexican ports, and the country could well enter into competition with other cane countries in the world's market. To do so it needs men with knowledge and capital to invest in sugar culture.

OPPORTUNITIES IN SPICE-GROWING

Cultivation of spices has been neglected in Mexico. Among the few that are grown are pimento and ginger, but neither is of any importance in the production of the country. Chillies, however, are grown in quantities, but mainly consumed within the country, being the principle spice used by the Mexicans of all classes.

Jamaica is the only country whence pimento or allspice is exported at present. As it grows on even a very poor soil along the seaboard slopes, there is no reason why its cultivation in moderate quantities, allowing some export, would not be successful in Mexico.

The ginger plant has been distributed to all tropical countries, and is found in many parts of tropical Mexico growing without attention or care. There are many tracts of Mexico where ginger could be grown at a profit.

The nutmeg tree, which furnishes the nutmeg and mace of commerce, has been tried with success in Mexico, but its culture on a commercial scale has not been undertaken in this country. The localities suitable for this industry are, moreover, very limited.

The clove tree has been cultivated for many years in the West Indies, and it grows well in parts of tropical Mexico.

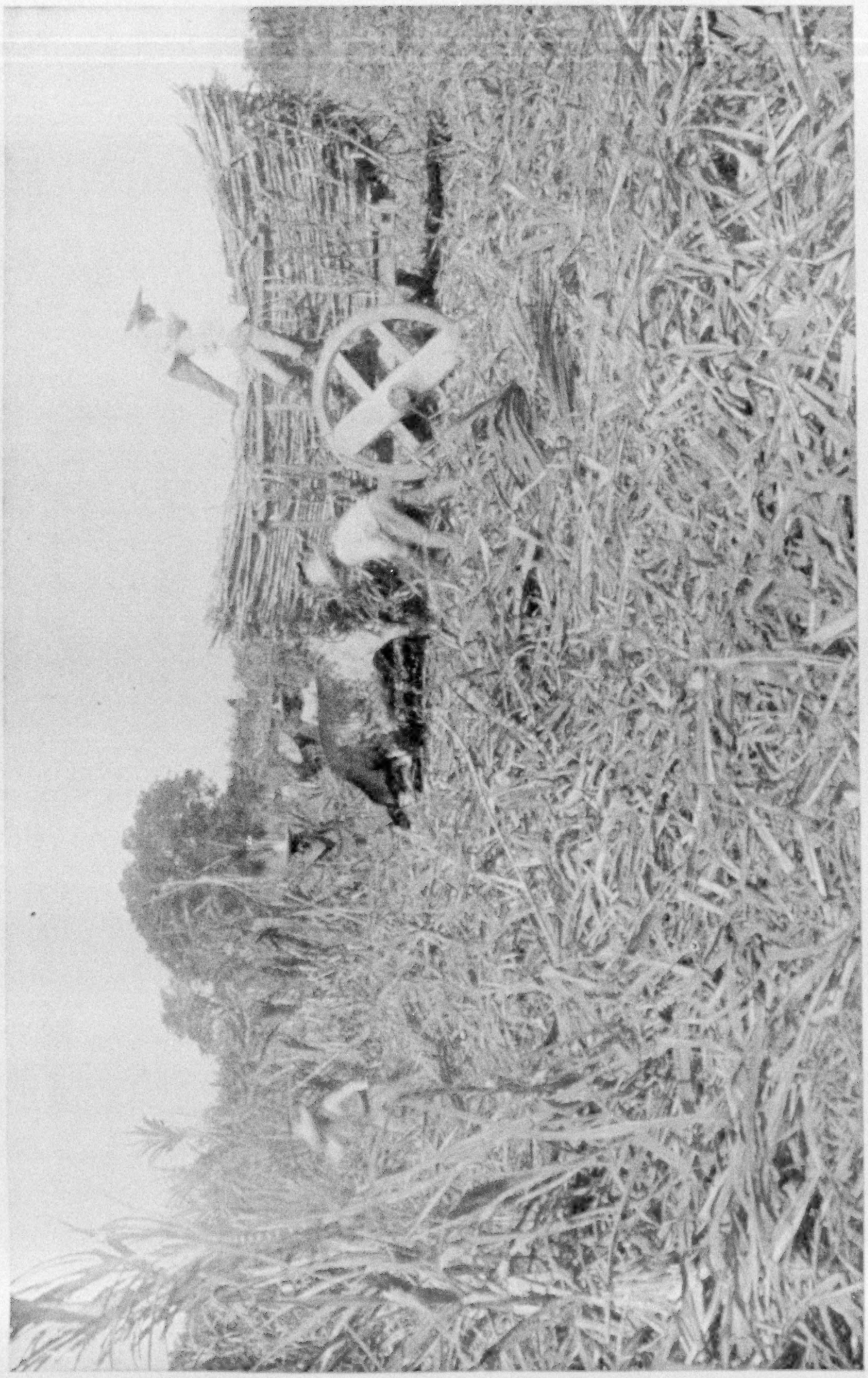
Cinnamon is extensively used in Mexico, as in all Latin countries, but its cultivation has not been undertaken in this country. The Ceylon cinnamon tree has been grown experimentally and succeeds well. In certain coffee districts in southern Mexico cinnamon-growing would doubtless be profitable, at least to the extent of furnishing the home market. Besides its use as a spice, cinnamon produces the cinnamon oil of commerce, for which there is always a limited market.

Cardamons would also be suitable on a small scale, and pepper culture would offer sufficient inducement to a few growers.

A VARIETY OF TROPICAL FRUITS

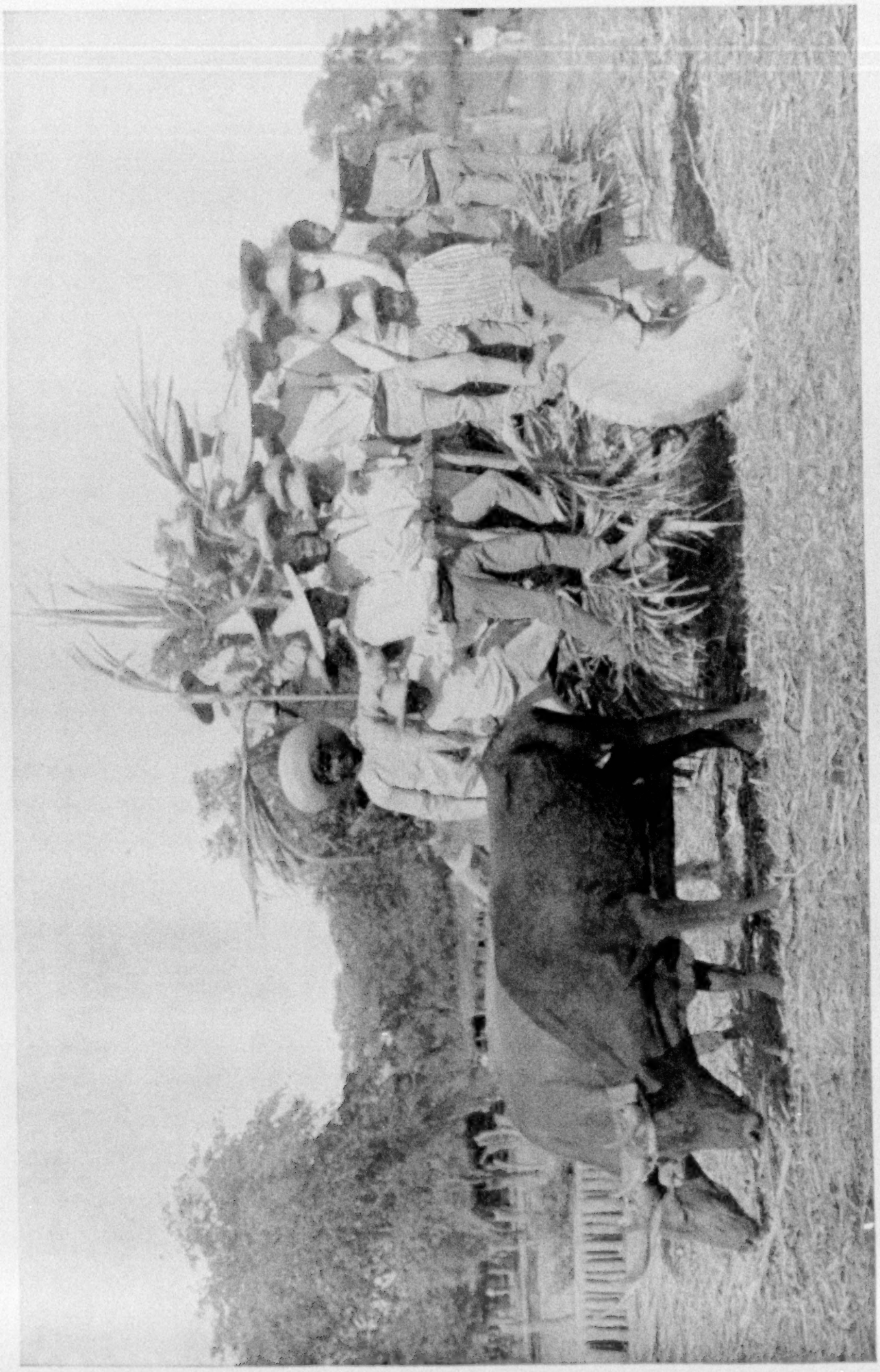
Mexico produces most of the fruits occurring in the tropics. The quantity grown is so insufficient, however, that very little is exported, and even within the country it is very difficult to get tropical fruits in the town markets. What is sold is very inferior in quality, showing that no care has been bestowed on the raising of the fruit.

Bananas are grown all over tropical Mexico, but systematic cultivation for export purposes has only been begun within



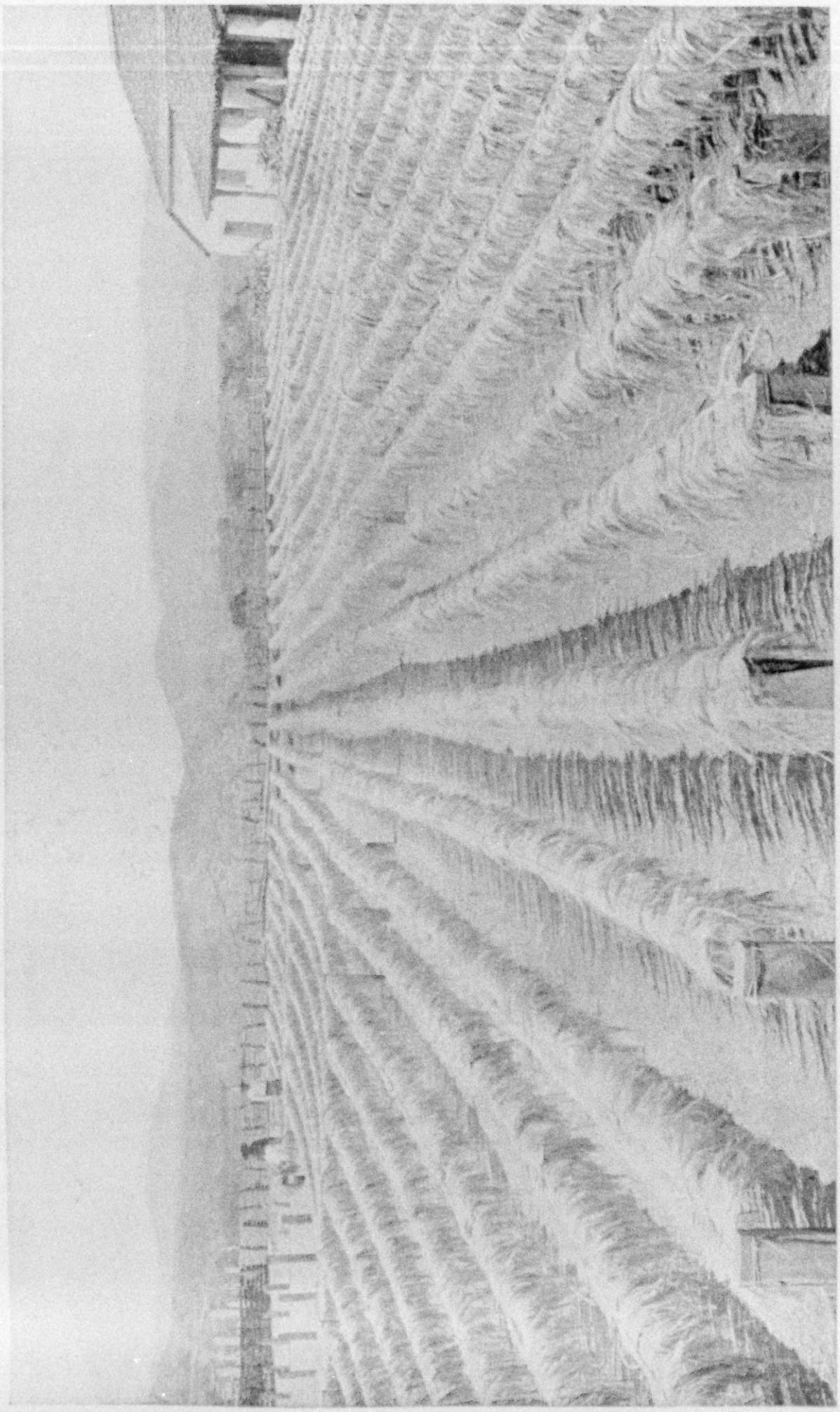
LOADING SUGAR-CANE: EL DORADO, SINALOA

Photo from Chas. Kirby Fox



LABORERS RETURNING FROM THE SUGAR-CANE FIELDS, SINALOA

Photo from Chas. Kirby Fox



DRYING THE HENEQUEN FIBER OF WHICH ROPE IS MADE, MEXICO

the last few years. Good communications and nearness to market are essential requirements for a banana industry. Such conditions, combined with good soil and sufficient water, are to be found in many locations in Mexico. The Tampico district is probably the best, but the coast lands of Tabasco and Vera Cruz, on the Atlantic, and of Chiapas and other coast States on the Pacific, are suitable.

Excellent pineapples are grown in Mexico, and the possibilities in this fruit are great, as it can be shipped fresh as well as canned.

Cashew nuts are grown in the extreme south; jujubes occur in places; the orange berry, or limoncito, the pomegranate, and the guava are no strangers, and the sapote chico, or sapodilla, is one of the most appreciated fruits in the country, as well as one of the commonest. The ground cherries, or "tomates de brihuega," are found in many native gardens; the tuna, or fruit of the prickly pear, is a favorite fruit in Mexico. Mulberries are widely planted, and the mango reaches perfection in certain districts, especially the variety known as the Manila mango. Were this fruit grown in sufficient quantities to be exported to the United States, it would certainly become a favorite in the market. At present not enough is grown to furnish sufficient fruit for home demands.

Of the various citrus fruits, oranges do well, lemons are grown in quantities, and limes, citrons, and grape-fruits are commonly cultivated.

The papaya, or papaw, is another tropical fruit which is easily cultivated and has a ready sale. Mexico has better varieties of this fruit than probably any other tropical country.

The breadfruit tree is grown in the south of Mexico, but very little used for culinary purposes. The various anonas, as the custard apple, the sweet-sop, and the sour-sop, are only sparingly cultivated.

The avocado, or alligator pear, is grown to perfection in Mexico, especially in Tabasco, and would form a valuable article of export if produced in larger quantities.

In regard to fruit-growing generally in the tropics, much could be done by small capitalists, especially if several combined for coöperative export.

MEXICAN FIBERS

Mexico is essentially a country of fibers. The henequen, or sisal hemp, production of Mexico is enormous, and many millions have been made by the henequen planters of Yucatan, which is the chief seat of this industry.

Pita fiber and ixtle are two other fibers well known as specifically Mexican, and the zapupe has recently come to notice. Cadillo fiber occurs wild, and has not yet been grown to any extent. Its high price in the market should, however, warrant its cultivation.

Cotton is grown in northern Mexico, and recently the introduction of the hybrid Caravonica cotton from Australia has revived the interest in cotton-growing in the Mexican tropics, especially on the Pacific slope, which is eminently suited for this purpose.

RUBBER-PLANTING

Few tropical industries have received more attention in late times than rubber. The spreading use of this commodity in connection with electricity and in the bicycle and motor tire industries, has raised the price to a high level, and consequently rubber culture is being studied all over the tropical world.

Mexico has until recently been leading in regard to the area planted in rubber, but the development of the industry in this country has been somewhat retarded on account of the many promotion schemes of imaginary rubber plantations which have been sprung upon the American public.

The large yields which the rubber tree produces are, however, sufficient to induce capital to take up this industry, although the time of waiting for returns on the investment is very long—as much as six and seven years.

The investigations and experiments of the last few years of the methods of cultivating and preparing rubber have placed the industry on a firm footing.

MASKS FOR SALE FOR A FIESTA IN A MEXICAN TOWN Photo from Russell Hastings Millward

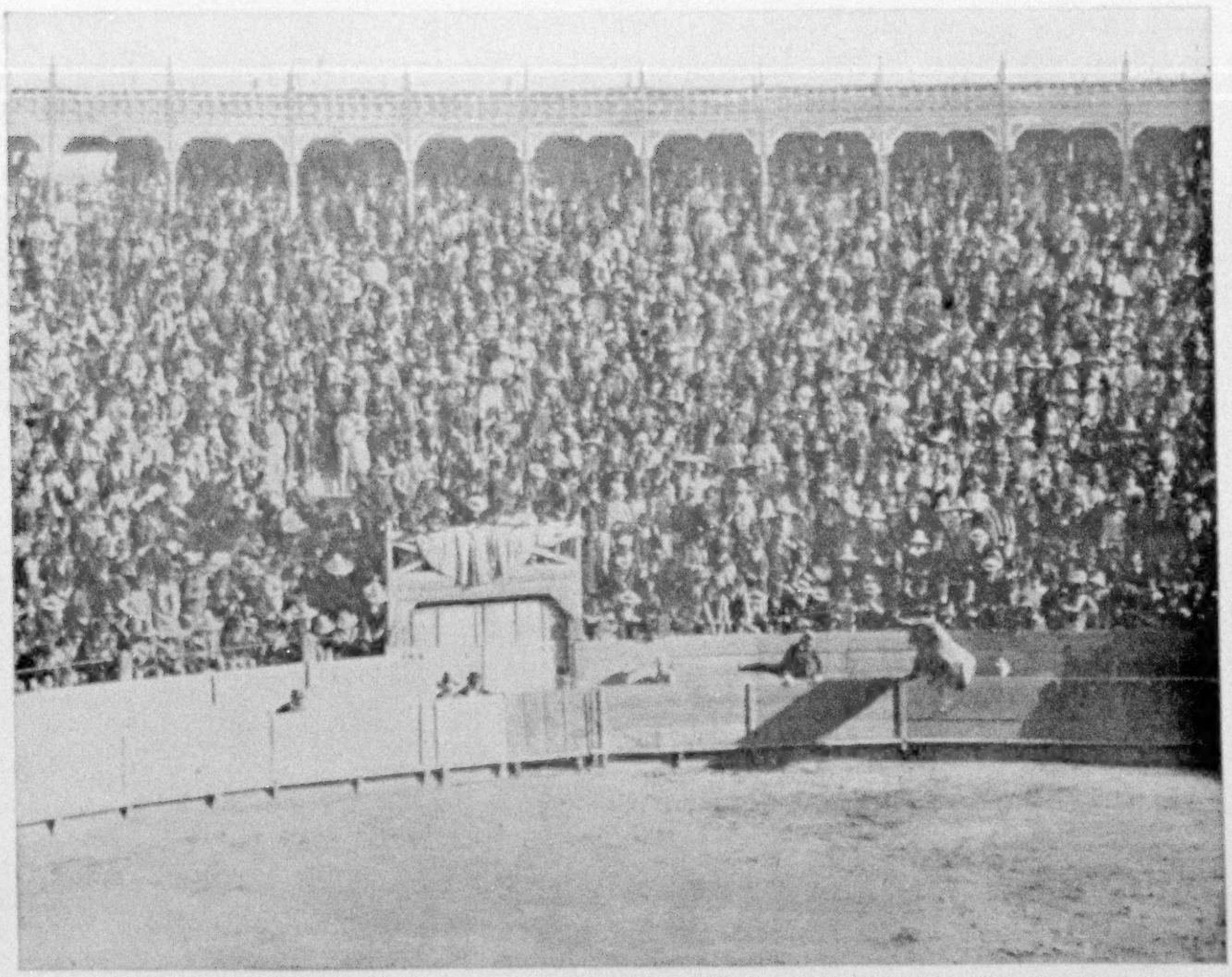


Photo from Mrs Harriet Chalmers Adams

AN ANXIOUS MOMENT: MEXICO

The details of the industry are now quite well known; there is no need of costly experiments, but the rubber planter can develop his estate with as much certainty as a coffee or cacao grower.

Growing of camphor has only been experimented with in Mexico, but many planters have recently become interested and small plantings are being made in various parts of the country, so that in a few years there will be sufficient to crop. Camphor cultivation promises to become a very important industry, as camphor is being used to a great extent for industrial purposes. Mexico has large tracts of mountain lands in the tropics suitable for this industry, and is only waiting for capital and enterprise.

PROTECTION FOR FOREIGN INVESTORS

Law and order are well upheld in Mexico—better than in many countries claiming a higher degree of civilization. The traveler is perfectly safe in any part of Mexico. Where trouble has arisen it has been upon the provocation of the traveler and stranger, who has not taken into consideration the peculiar customs of the country, but has wanted his own way, whether this has been in accordance with the desires of the natives or not.

Foreign investors in agricultural properties are well protected in Mexico, whether the investment is made by private persons or corporations. The latter need not be Mexican corporations, but it is always safer for a foreign company to be legally registered in Mexico. Land titles are not always good, and the purchaser of agricultural land in the Republic should take good care in having the documents properly investigated by reputable lawyers practicing in Mexico.

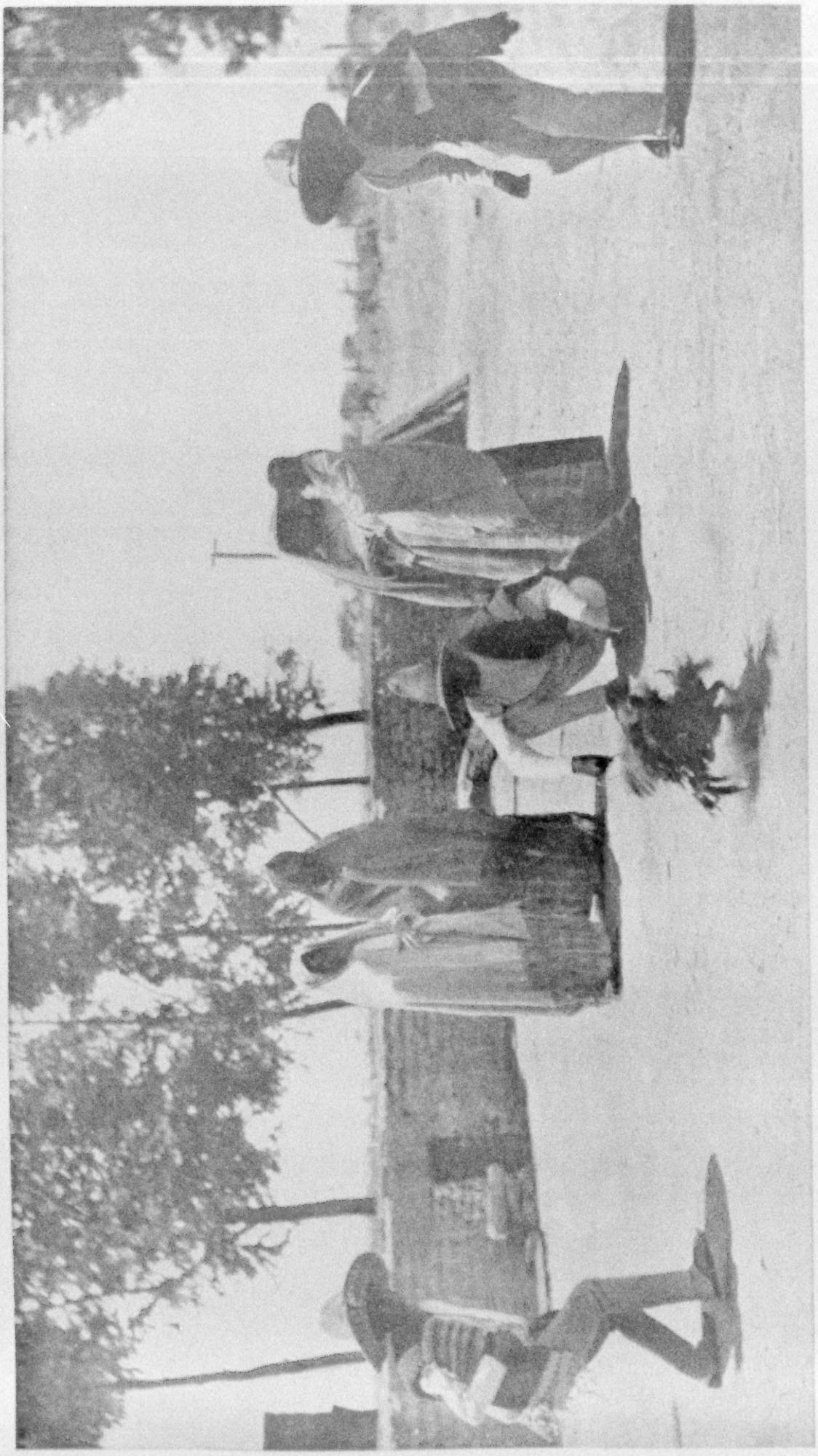


Photo from Mrs Harriet Chalmers Adams

THE POPULAR DIVERSION AMONG THE UNEDUCATED CLASSES: MEXICO

Photo from Mrs Harriet Chalmers Adams

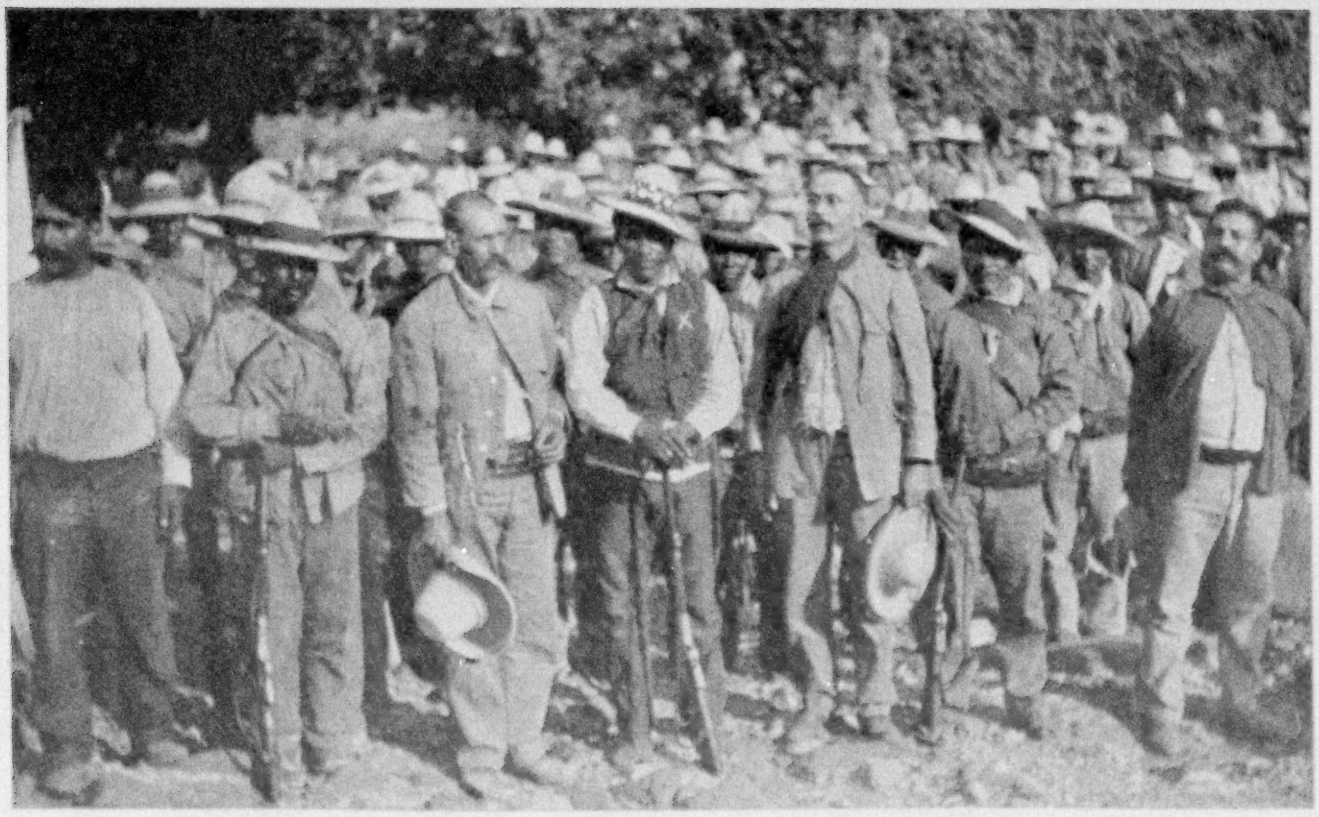
A CONSIGNMENT OF FIGHTING COCKS

Note the specially constructed basket, with its padded sides. Only specially bred cocks are treated with such consideration

YAQUIS WAITING FOR TRAIN TO YUCATAN, MEXICO

Photo from Franklin Adams

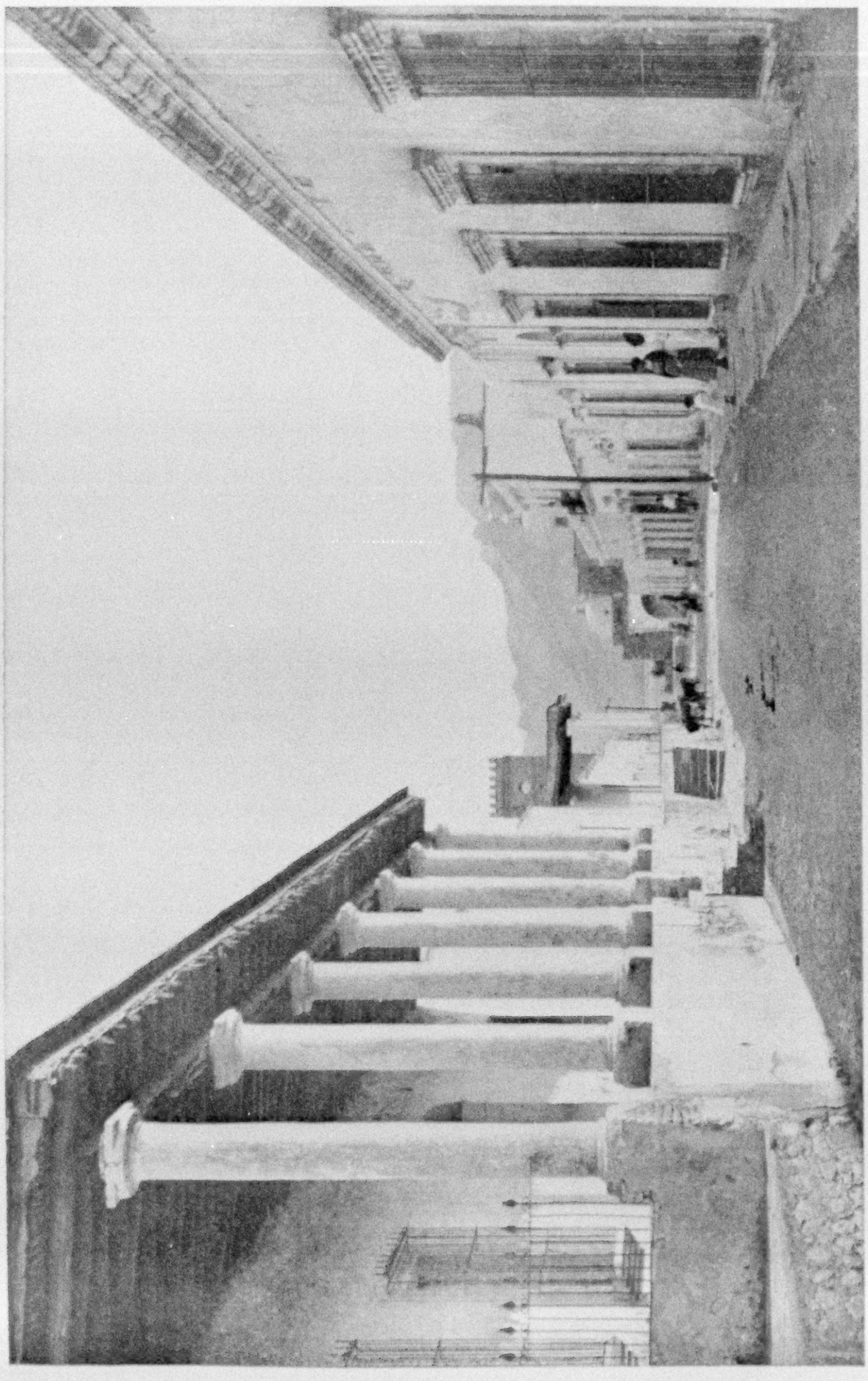
Owing to the continual disturbances of the Yaqui Indians the Mexican government transported a large number of them from Sonora to Yucatan



Photos from Mrs Harriet Chalmers Adams

LOADING YAQUIS FOR YUCATAN, MEXICO

A GROUP OF YAQUI INDIANS



STREET SCENE IN ALAMOS, SONORA, A TYPICAL MEXICAN TOWN

Photo from Chas. Kirby Fox

AN INTERESTING VISIT TO THE ANCIENT PYRAMIDS OF SAN JUAN TEOTIHUACAN

By A. C. Galloway

BOARDING the train that leaves Mexico City at 7 a. m., the traveler arrives at San Juan Teotihuacan soon after 8 o'clock. There is also a good automobile road which is often chosen by visitors.

In Egypt he would be greeted with the cry of "Change cars for the Pyramids." Here we were met and escorted to a handcar on a short narrow-gauge road used by the government during its present work, which, propelled by four soldiers, was soon in rapid motion. Once out in the open, we enjoyed the mode of transit while inhaling the fresh, crisp air of a cool January morning. As seen from the train, the pyramids appear almost insignificant, and only by near approach are the ambitious heights to be appreciated.

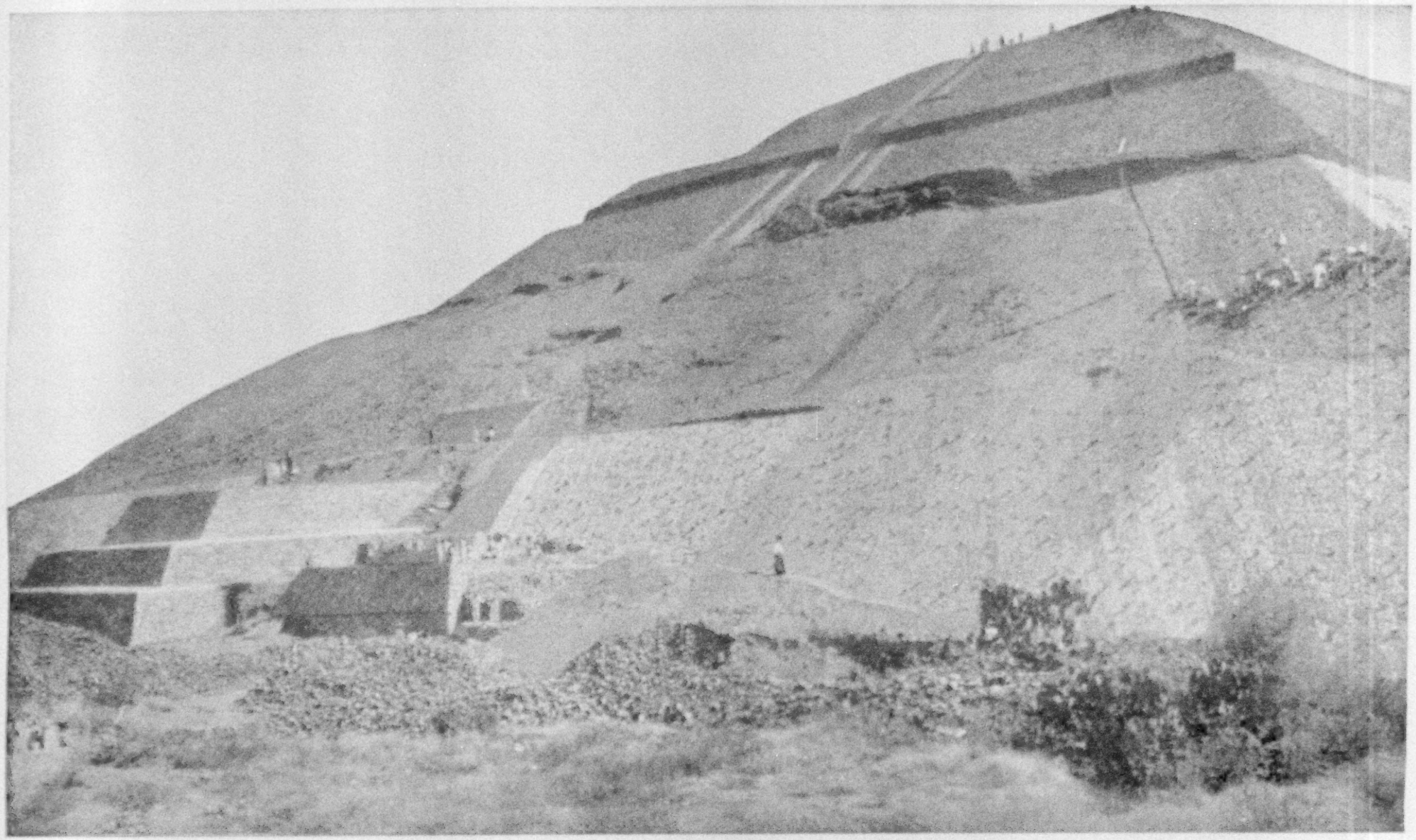
We passed first through what is known as the Casa de Sacerdotes (house of the priests), showing remarkable walls, terrace, and stairway of 13 steps, all in excellent preservation. Different sections are to be seen open to the light of day after centuries of darkness. Canals cut in the walls show their uses as conductors of water, while portions of decorations and designs on the walls still exhibit most beautiful tones and shades of colors, in the mixing of which time has not given away the secret.

There is also a subterranean dwelling which we went through, and this is almost entirely excavated. As the guide led us from room to room with lighted candles, drawing attention to different things of interest, we wondered what were the secrets that had remained hidden for so many centuries, and why the choosing of a house built underground. The holes in the walls at the entrance show how security was assured, much as in the present day in primitive structures of the Indians. Imagination conjures up many pictures and peoples once again these silent chambers with the moving figures of a by-gone race, but such an impenetrable mist of fable envelopes the early history of Mexico that scientific investigation as well as archeological research have not yet lifted the veil to disclose the secret of these pyramids nor who were the builders, although it is asserted by historians that they were constructed by the Toltecs, while others claim that they were built by the Totonacs, pre-Toltec in history. All refer to them as a great religious center.

It may here be of interest to observe that the Toltecs are traced to have settled in the ancient city of Tula (near the capital of Mexico) about the year 674 of the Christian era. This enables the reader to form an idea of the centuries that have passed since the construction of the pyramids, if conjecture alone can be accepted as history.

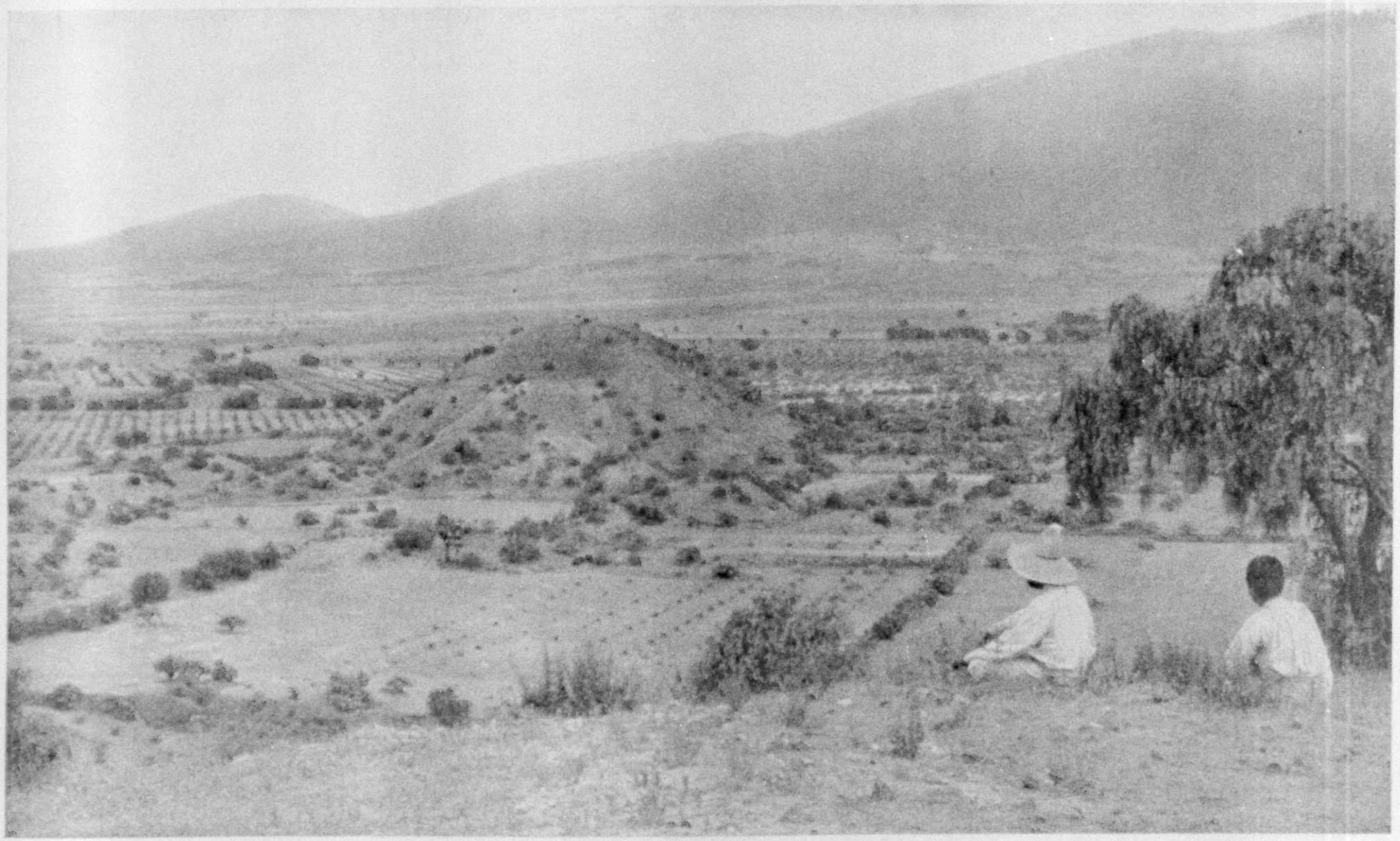
Certain it is that the pyramids of Teotihuacan, as well as that of Cholula, have kept their heads above the vomiting of angry volcanoes for numberless centuries, while it would appear that the cities near by were without doubt buried in those bygone ages by volcanic eruptions. The Toltecs were by tradition famous mound-builders, and here it seems they mingled with their reverence for the Supreme Being the mythical religion of astral worship. Their earliest temples were devoted to the sun. The moon they worshiped as his wife and the stars as his sisters. No image was allowed within these temples, and their offerings were perfumed flowers and sweet-scented gums.

Going some distance in an opposite direction, we entered a fine grotto. On the occasion of the visit of President Diaz and party, it was converted into a banqueting hall, and the effect was



THE MOST COLOSSAL STRUCTURE OF PREHISTORIC MAN IN AMERICA: THE PYRAMID OF THE SUN (RESTORED): TEOTIHUACAN, MEXICO

"In the magnitude of its remains and in the evidence the site furnishes of population and antiquity, Teotihuacan stands easily at the head of the ancient cities of Mexico. It lacks the well-preserved, sculpture-decorated buildings found elsewhere in Mexico and Central America, but this is doubtless due to the rarity of suitable building stone in this part of the valley. The famous structures of Mitla, Palenque, Uxmal, and Chichen-Itza, had they been built of such materials as are here available, would today be mere rounded heaps of débris."—W. H. Holmes.



VIEW OF THE PYRAMID OF THE MOON FROM THE TOP OF THE GREAT PYRAMID OF THE SUN

There are nearly 200 mounds surrounding the pyramids of the Sun and of the Moon, which probably in ancient times were crowned by temples and public buildings

Photo from Mrs Harriet Chalmers Adams

HATS AND BASKETS FOR SALE: MEXICO

grandiose as well as historical. Owls and strange night-birds fly in and out and build their homes behind columns of lava, and these in rude, strange eloquence seemed to express their disapproval of our momentary invasion.

Soon we stood at the foot of the highest pyramid, "El Sol," which has so recently been bereft of the mantle of grass, underbrush, and trees that for centuries had covered it. Looking upward, we realized the infinite labor that has shown to the world of today the arduous task of the ancient Toltecs, and the pyramid, like a sentinel of time, stands as an imposing monument, Sphinx-like in its impenetrable mystery and silence, hiding within its depths those secrets yet to be discovered.

The projecting stones, seen here and there over the pyramid, mark the upward progress of those indefatigable workers until they gained the summit of their ambition. The pyramid was divided into stories by placing a series of truncated pyramids one above the other.

Two hundred and sixty-eight steps must be climbed to reach the summit. The pyramid is 216 feet in height, and has a base about 761 feet square. The summit is 59 by 105 feet square. Now and again on our way upward we found a few minutes' rest desirable, while others of our party remained half way until our return. Some distance up there is a stairway that calls much attention and evidently leads to the very bowels of the pyramid. What secrets may it divulge as the excavation is followed deeper and deeper? Perhaps some hidden sarcophagus of Toltec priests and their people, or a tomb of ancient Toltec kings; but all is conjecture and therein lies the mystery and charm of the pyramids. President Diaz expressed great interest in this stairway on his visit to the ruins some time ago.

Many strange idols have been dug up—Dioses of grotesque form and many others. Many beautiful pieces of jade and obsidian, arrow-heads, little heads of burnt clay, earthen jars of antique form, and others similar to those in use at the present time. One little piece of cloth that was found is carefully guarded in the museum. What was its use? Many skulls, as well as some skeletons, have also been unearthed.

The general theme of the stone tracery yet discovered is the emblem of the sun, its rays being especially noticeable in all carvings and designs—significant of their religion, "the astral worship."

Photo from Mrs Harriet Chalmers Adams

AZTEC CALENDAR STONE IN THE NATIONAL MUSEUM, MEXICO CITY, MEXICO

The ancient Mexican year, like ours, was 365 days, but it was divided into thirteen months. The face in the center of the above picture is the "God-Star" throwing his light over the earth, which is represented by the tongue projecting from his lips.

Having reached the summit, we were richly rewarded, for a fine expanse of country lay unfolded to our gaze, with just a peep of the snow-capped volcano Popocatepetl far in the distance, while yonder the little town of San Juan appeared sleepily dreaming under the shadow of the pyramids. Turning to the right, not far distant stands the Pyramid of the Moon (la Luna), smaller than the one we have just ascended, but looking very green and attractive, covered yet with its mantle of grass, heavy underbrush, and trees, through which is clearly defined the little pathway we shall soon tread, as so many travelers have already done. This pyramid will gradually undergo the process of regeneration, and in the course of months will appear bereft of its covering and stand in clear outline against the azure sky, as does its mate, "El Sol."

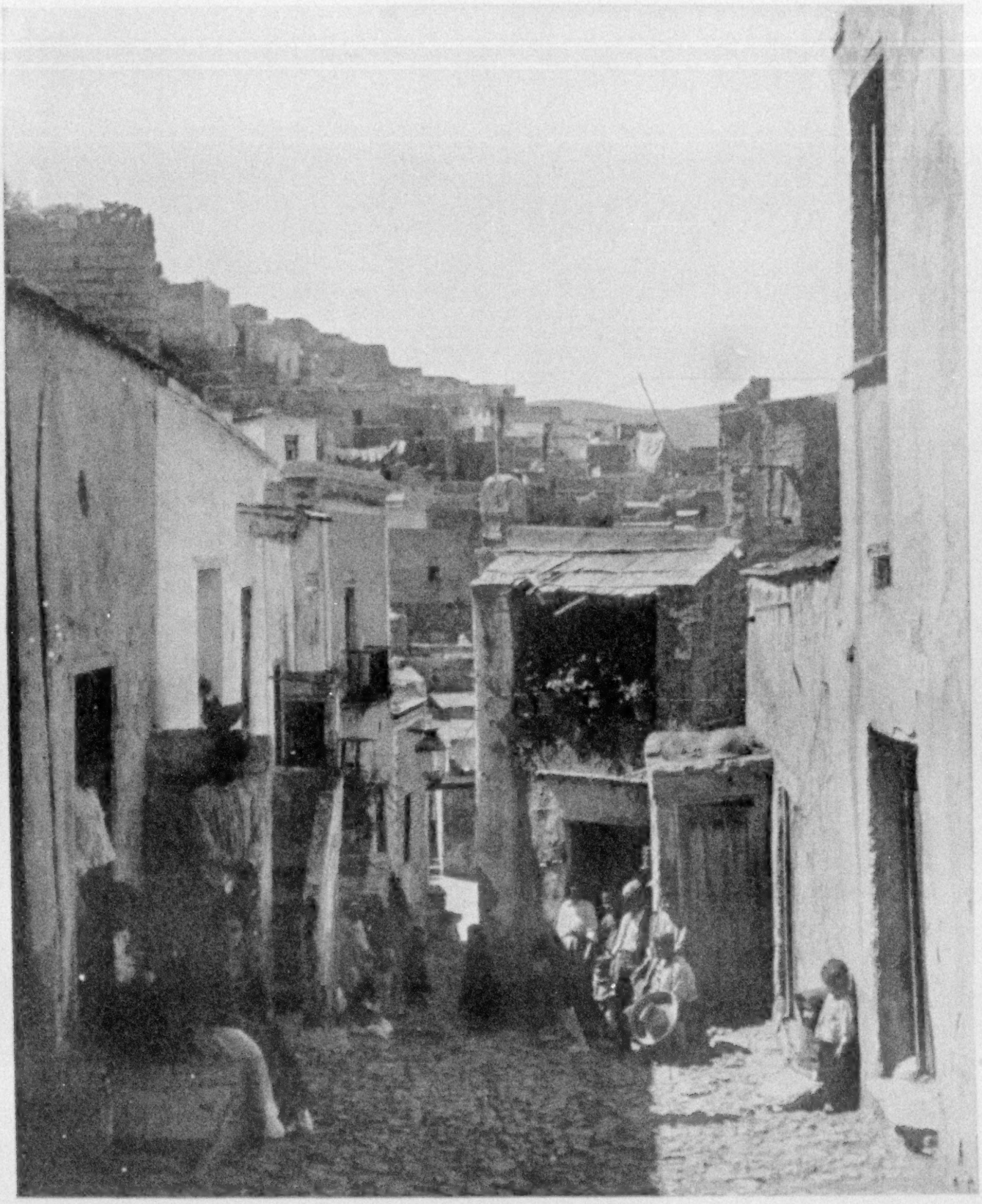


Photo from Mrs Harriet Chalmers Adams

STREET IN GUANAJUATO, A TOWN NOT FAR FROM MEXICO CITY

But to many there is a beauty in the soft covering of innumerable centuries, which for the preservation of the monuments must now be swept away. It enhances the ruggedness of man's efforts in his ambition to construct such enduring monuments, and softens, with its gentle touch, every stone and corner. "La Luna" is 150 feet high, while its base is 170 by 142 feet.

Between the two pyramids the eye traverses the street of the dead (el callejon de los muertos) until the "Salon of Agriculture" is reached, where behind

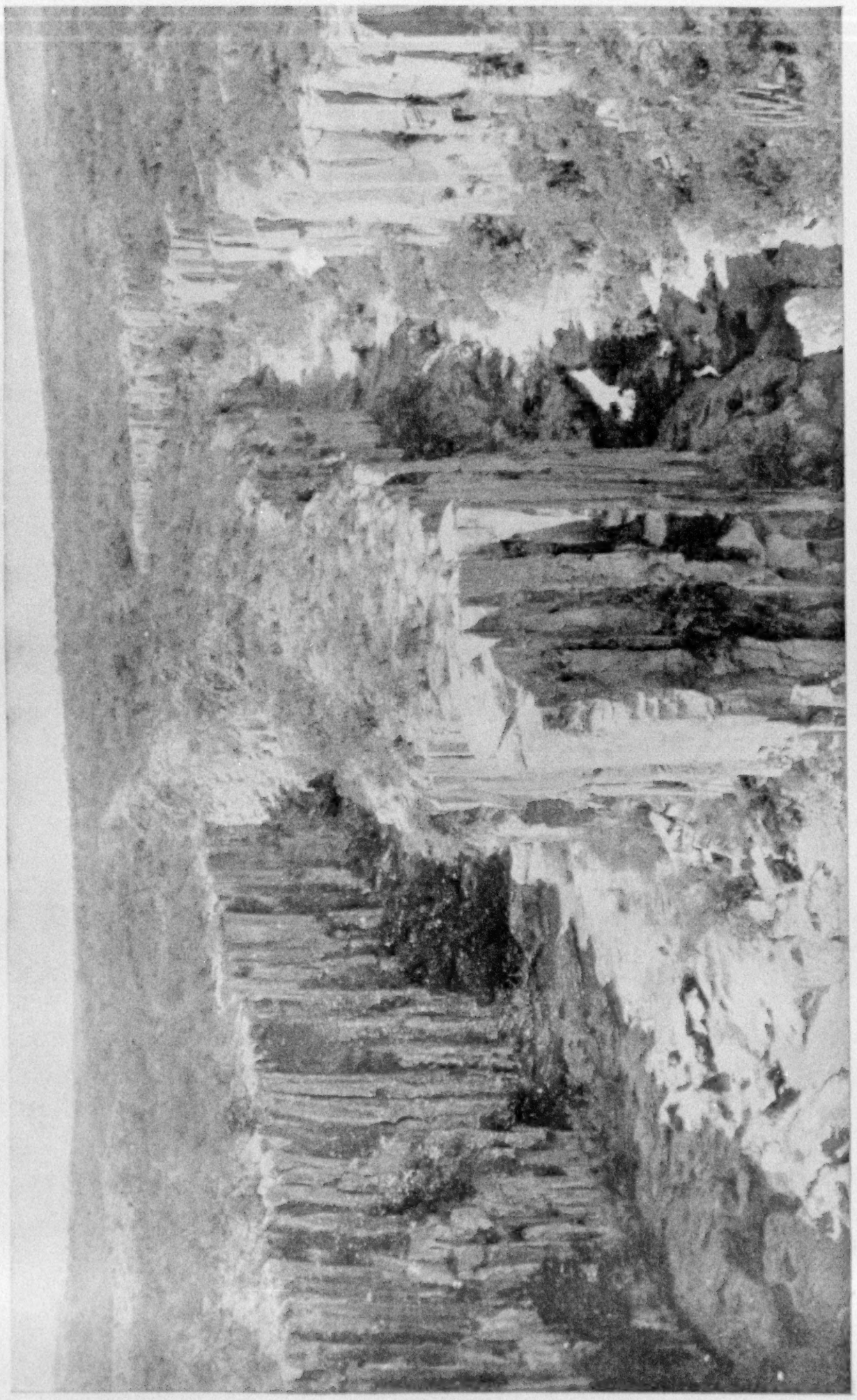
glass cases some remarkable designs and colored archeological treasures are guarded. The ancient Toltecs were artists in the beautiful shades of color they used, which are still visible, especially the pinks and greens. In another direction we observed what is said to have been the "citadel" of this buried city, showing a large mound surrounded by fifteen smaller ones. All of these will eventually be excavated.

In all there exist 180 mounds surrounding the two large pyramids, which are to be treated similarly and their preservation thus assured. Looking over the scene, one harmonizes the purposes of these with the environment. Some of them were forts for defense; some of them were religious, with their court of women, court of laity, and other societies. If only on some bright, sunny day the pageant could return, as we picture it during the Toltec dynasty, what a remarkable sight it would afford! Every terrace filled with strange people, with strange costumes in which gold and silver and the gaudy plumage of tropical birds lent their willing service.

But in the words (which history has preserved to us) of the great King Nexahualcoyatle, King of the Toltecs, whose death took place about the year 1470, we find an answer: "All round, the world is but a sepulchre, and there is nothing that lives on its surface that shall not be hidden and entombed beneath it. The things of yesterday are no more today, and the things of today shall cease perhaps on the morrow. These glories have all passed away, like the fearful smoke that issues from the throat of Popocatepetl, with no other existence than the record on the page of the chronicler. The great, the wise, the valiant, and the beautiful, alas! where are they now? That which has befallen them shall happen to us and to those that come after us. The horrors of the tomb are but the cradle of the sun and the dark shadows of death are brilliant lights for the stars."

The mystic import of this last sentence, says Prescott, seems to point to that superstition respecting the mansions of the sun which forms so beautiful a contrast to the dark features of the Aztec mythology.

A PROLIFIC COFFEE TREE: MEXICO

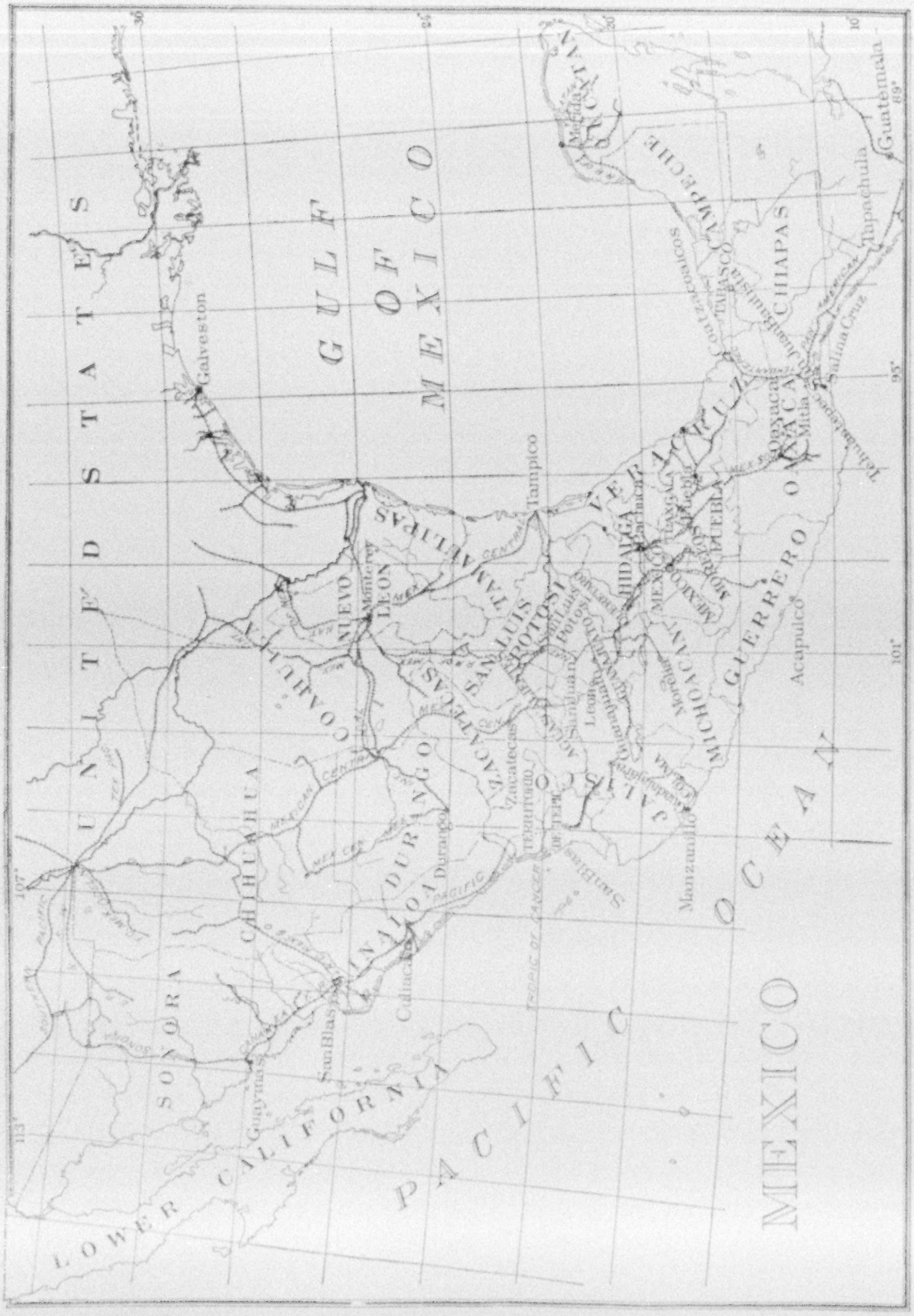


VIEW OF A DEEP BARRANCA IN MEXICO Photo from Mrs Harriet Chalmers Adams

This picture shows the interception of these wonderful gorges in the midst of comparatively level plains

Photo from Chas. Kirby Fox

SCENE ON THE PACIFIC COAST: SINALOA, MEXICO



OUTLINE MAP OF MEXICO

A NORTH HOLLAND CHEESE MARKET

By Hugh M. Smith

Deputy Commissioner, U. S. Bureau of Fisheries

ALKMAAR, celebrated in Dutch history for its successful defense against the Spaniards in 1573, has been noted in modern times for its cheese trade, which is the most extensive in North Holland. The town, of 20,000 people, displays the neatness and cleanliness typical of the country, but would have little attraction for foreign sightseers beyond its quaint seventeenth century domestic architecture were it not for the great market in round yellow cheeses with which, in America, the name Edam is associated.

The market is held every Friday, and is participated in by the dairymen of all the surrounding districts, some of whom bring their cheeses in wagons and carts, while others find it more convenient to come in canal-boats. Preparations for the market begin the day before, as considerable time is required for the unloading and arranging of the cheeses, and the afternoon before a market day is an occasion of much bustle. The intervening night interrupts operations on the market space, but bands of young peasants, men and women, parade the streets all night

THE CHEESE MARKET IN FULL SWING Photo by Hugh M. Smith

A part of the golden field as seen from a window in the weigh-house tower. Each of the piles contains from 500 to 900 cheeses

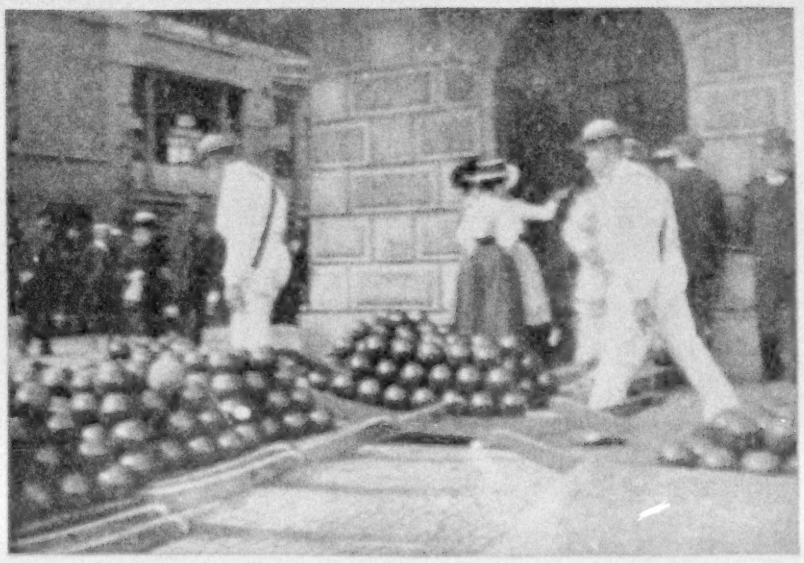
THE WEIGH-HOUSE AT ALKMAAR, 1582

In the canal are barges in which cheeses have been brought to market

long singing and skylarking, and cheese carts continue to arrive in the darkness and clatter along the stony pavements. Therefore there is little sleep for the visitor who has come to Alkmaar the day before to be ready for the great sale.

The market is held in a large rectangular, stone-paved square bounded on one side by a canal and on three sides by tall buildings occupied by shops and restaurants. The weigh-house, formed more than three centuries ago out of an already existing church edifice, dominates the market place. Its shapely clock-tower has moving figures of horsemen in a tourney and a beautiful carillon, one of whose airs is the wedding march from Lohengrin. Fancy buying cheese under such romantic circumstances!

The cheeses, whether in wagons or boats, are not carried in bulk, but are carefully arranged in layers separated by boards to prevent crushing or bruising. When ready for unloading, the wagons are drawn as near as practicable to the spaces assigned to their respective owners, and the canal-boats are moored alongside the quay; then, a piece of canvas having been spread on the stones, the cheeses are unpacked and arranged in square or oblong piles with narrow walks between. Usually the piles are 8 or 10 cheeses wide and 30 to 50 long, but some are only six cheeses square, and the piles are always two layers deep. The largest single pile at the market, here illustrated, contained 900 cheeses.



Photos by Hugh M. Smith

CHEESES BEFORE THE WEIGH-HOUSE

The unloading of the wagons and boats is one of the most interesting features of the market. One man, standing in a wagon or boat, takes two cheeses at

A REMOTE CORNER OF THE MARKET

A pair of official porters are taking a tray-load of cheeses to the weigh-house. The picture shows how carefully the piles are covered until and after the hour of the market

a time, one in each hand, and throws them to a man, either sitting or kneeling on the ground, who arranges them in regular piles. If the distance is considerable, an intermediate catcher and thrower may be required, but a throw of 30 feet presents no difficulties. The cheeses go through the air as though tied together, and are dexterously caught, a fumble being almost unknown. At times, especially during the strenuous half hour preceding the opening of the market, the yellow balls fly thickly in all directions.

Pending the beginning of the sale, the finished piles are covered with canvas, which is often supplemented with rush mats, straw, or grass, to protect the cheeses from sun and rain, and also to prevent drying of the surface; during the night, also, the canvas is thrown over the piles. We would not expect a Dutch tradesman to neglect any precaution that will improve the appearance of his goods; consequently we find that the cheeses are thoroughly greased to make them look fresh and inviting, and immediately before the sale some of the vendors, with a dish of oil and a soft cloth in hand, will liberally anoint every cheese in the upper layers.

Shortly before 10 o'clock the four large balance-scales in the weigh-house are adjusted with the most scrupulous care by a man in silk hat and frock coat, and a large number of aged porters ("Kaasdragers") congregate in an adjacent room and soon emerge clad wholly in white except for their black slippers and bright-colored straw hats. The hats are of blue, red, yellow, green, purple, and other distinctive colors, with ribbons of the same shade hanging down behind, and the men wearing the same colors work together in pairs.

Promptly as the clock in the weigh-house tower sounds the hour of 10, the bustle assumes a new aspect; promiscuous conversation, with a strong caseous bias, ceases and cheese becomes the sole topic; the countrymen remove the coverings from their product, and the whole field bursts into golden bloom, and im-

Photo from Hugh M. Smith

WINDMILL, OF WALCHEREN, OF THE PROVINCE OF ZEALAND, HOLLAND

The island of Walcheren was the scene of one of the greatest disasters in British history. When the Earl of Chatham was driven out of Holland, after the invasion of the summer of 1809, he left 15,000 troops on Walcheren. More than one-half of them perished here from swamp fever before relief came in December, and half of the remainder were permanently disabled. All the photographs given on pages 1054-1066 were taken in the province of Zealand, whose inhabitants still retain many quaint and archaic peculiarities of dress, and speak the variety of Dutch known as Low Frankish.

BUSY CHILDREN OF WALCHEREN Photo from Hugh M. Smith

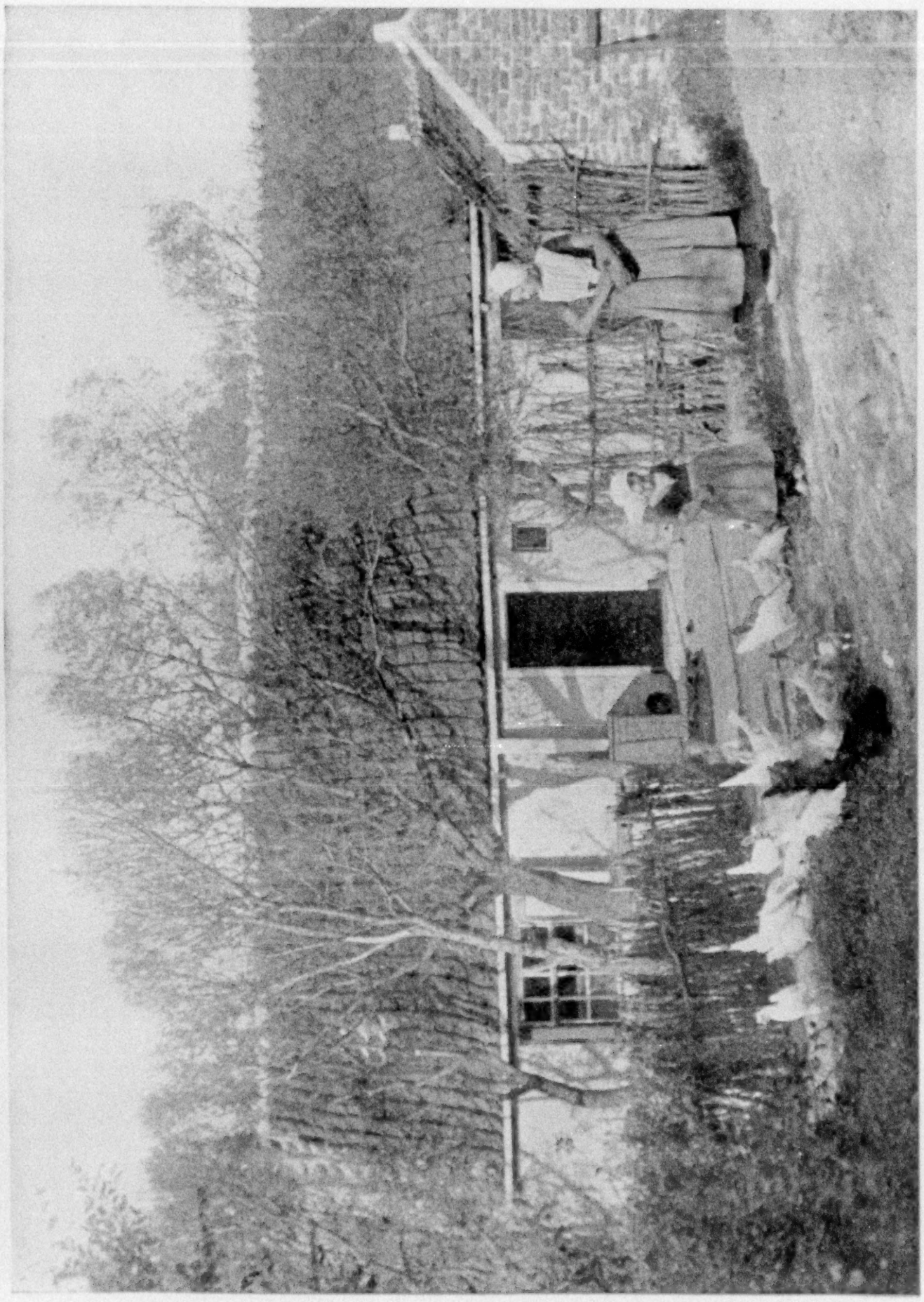
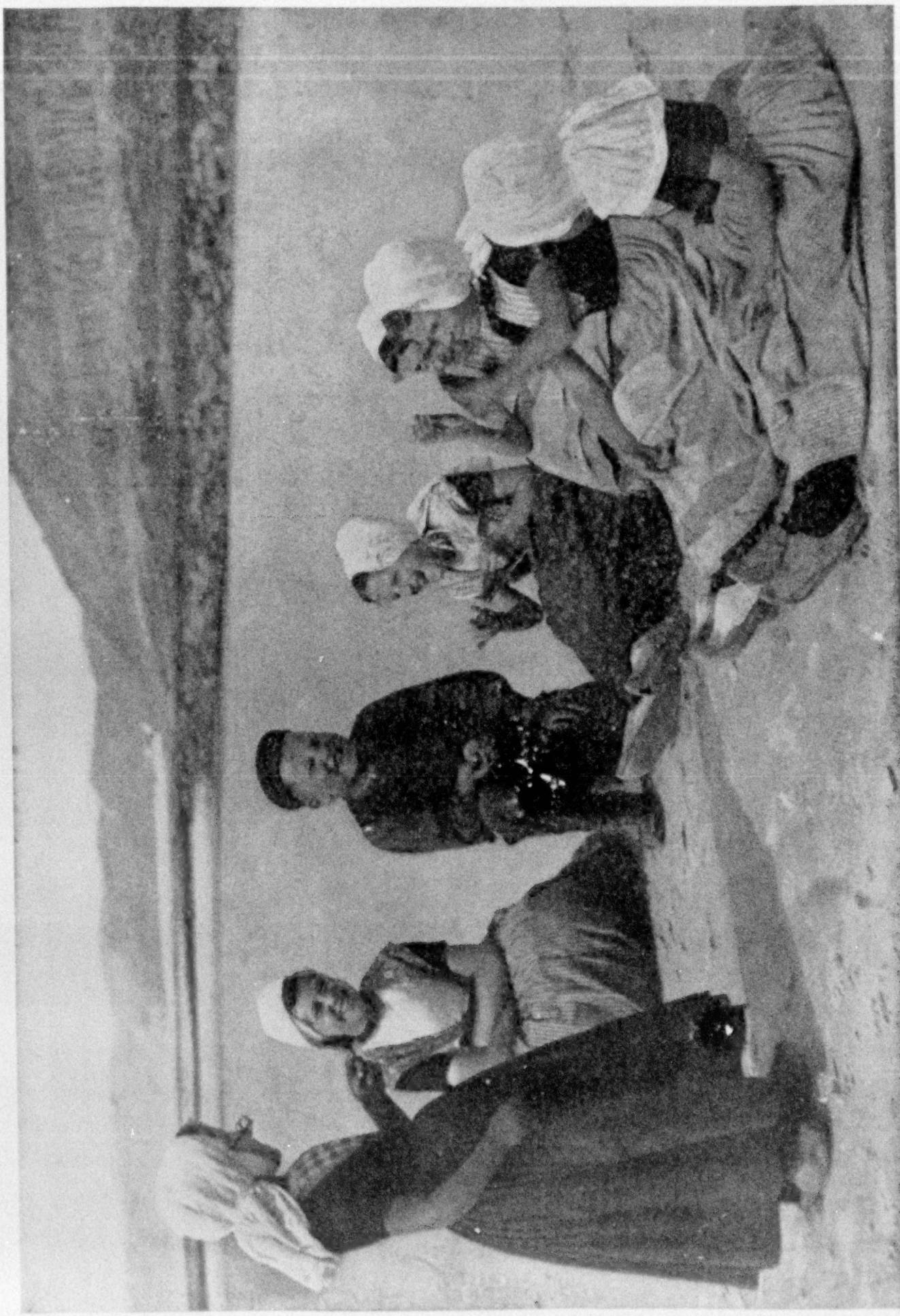


Photo from Hugh M. Smith

A FARM ON THE ISLAND OF WALCHEREN

The island is protected from the sea by dunes and dikes, and is very fertile



MIMICKING THE TEACHER: WALCHEREN

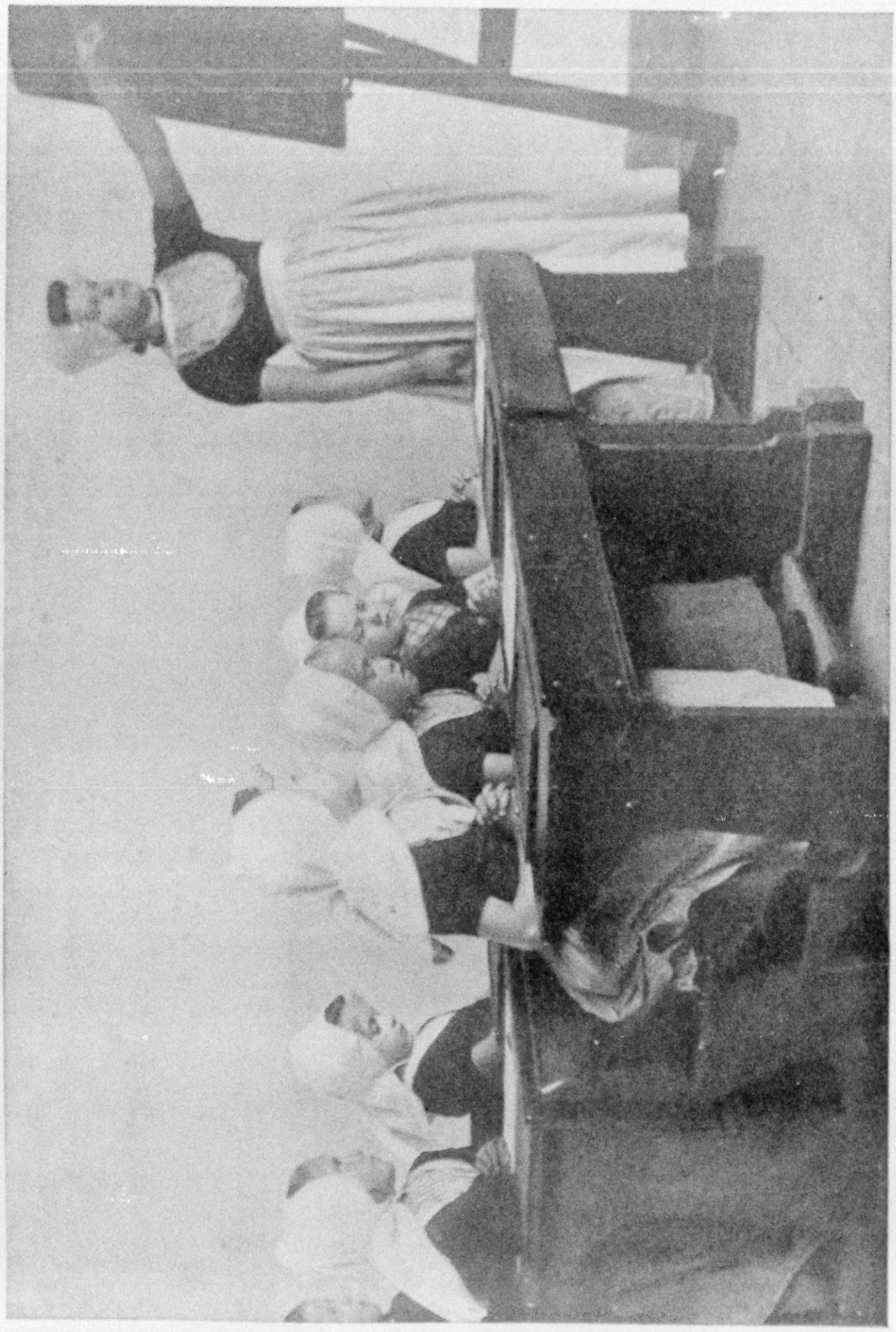
Photo from Hugh M. Smith

ON THE BEACH: WALCHEREN

Photo from Hugh M. Smith

CHILDREN PLAYING ON THE BEACH : WALCHEREN

Photo from Hugh M. Smith

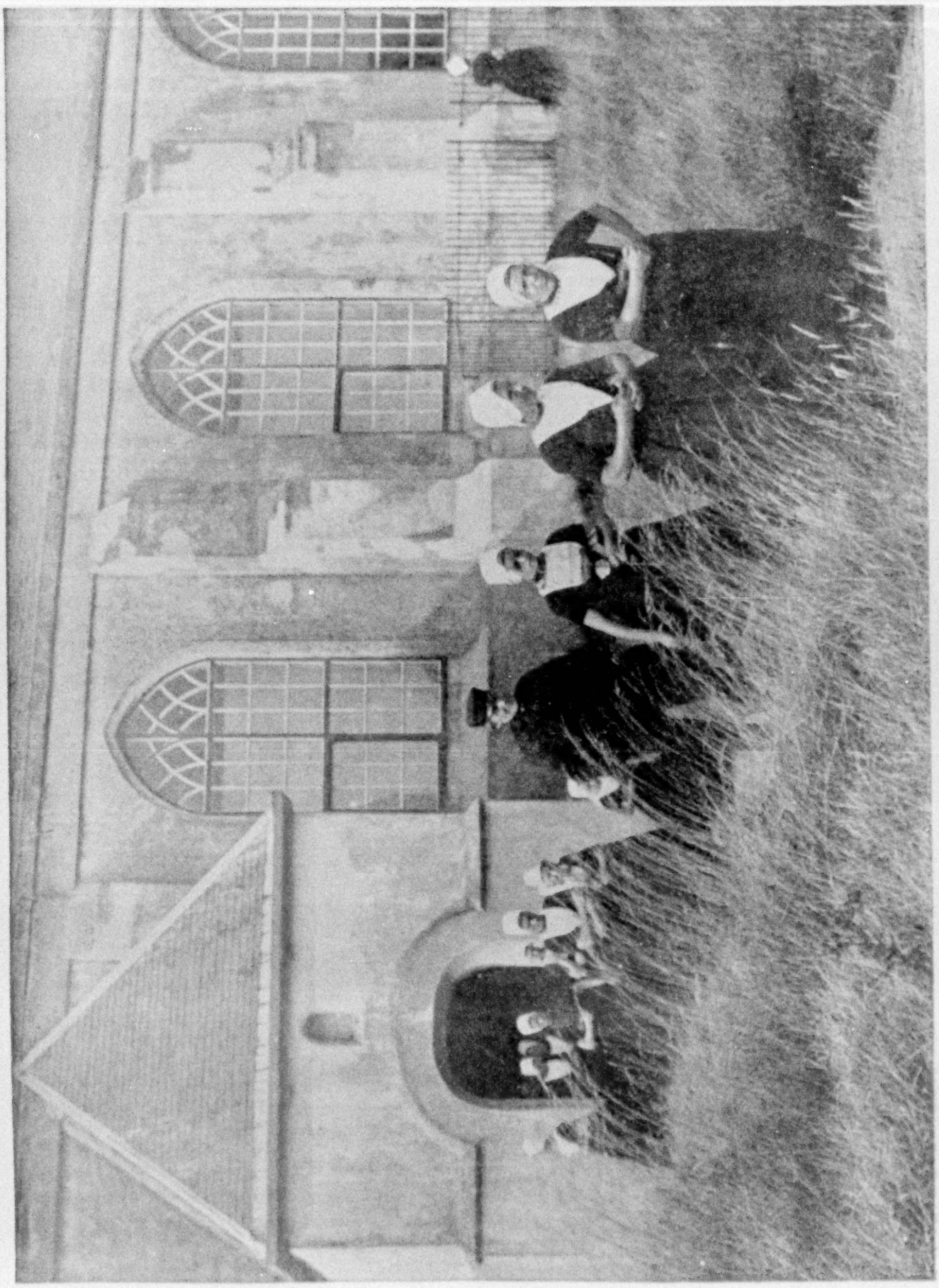


A SCHOOL AT DOMBURG, WALCHEREN

Photo from Hugh M. Smith

WALCHEREN CHILDREN AND THEIR WOODEN SHOES

Photo from Hugh M. Smith



ZANTELANDE CHURCH: WALCHEREN

Photo from Hugh M. Smith

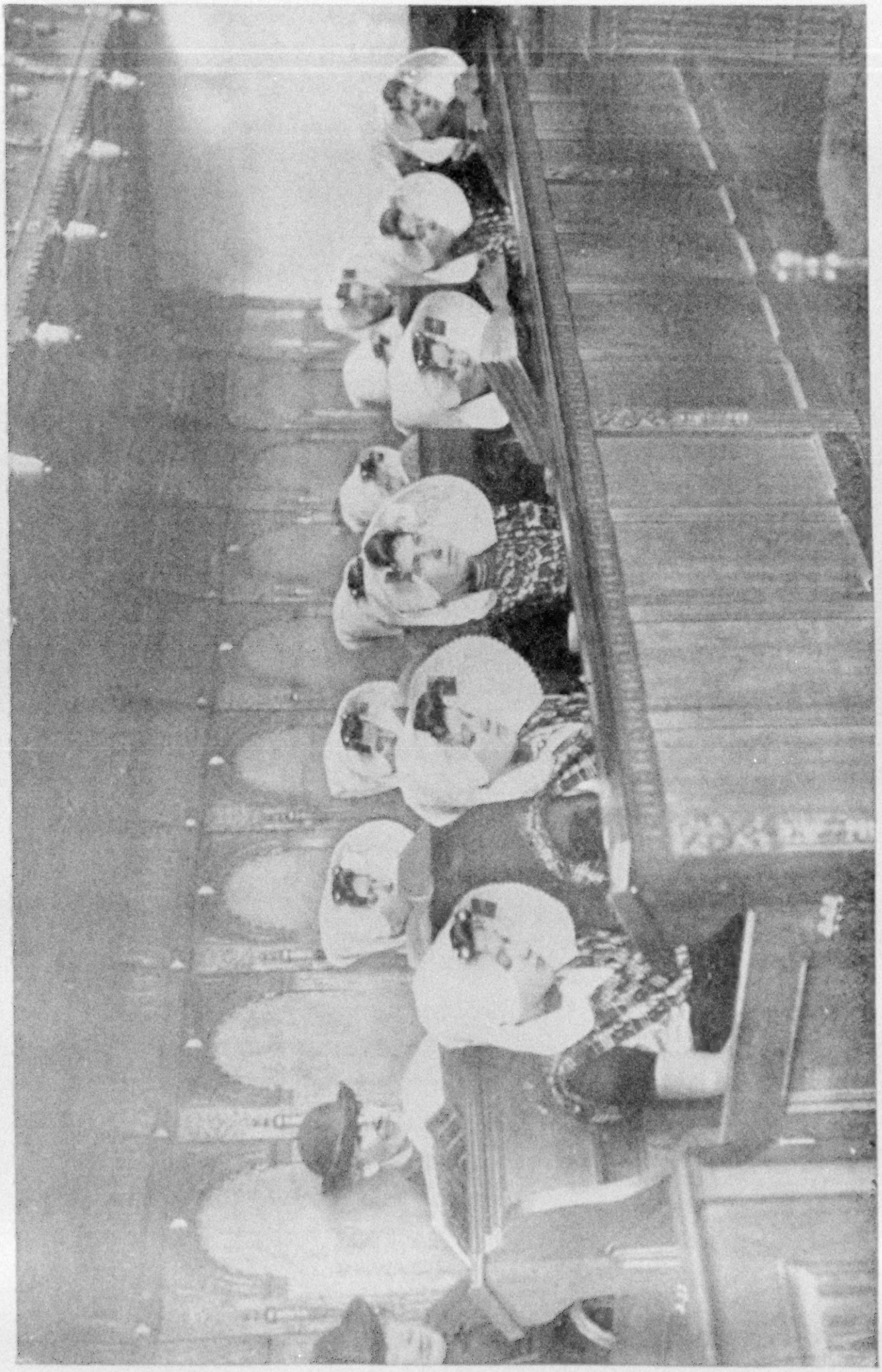


Photo from Hugh M. Smith

CHURCH INTERIOR; SOUTH BEVELAND

MARKET PLACE AT MIDDELBURG, THE CAPITAL OF WALCHEREN Photo from Hugh M. Smith

Photo from Hugh M. Smith

CHILDREN OF SOUTH BEVELAND, AN ISLAND ADJACENT TO WALCHEREN

These two islands form part of the province of Zealand, the greater portion of whose surface is below the level of the sea. The province is protected by more than 300 miles of dikes

mediately the market is in full blast. Sales are not made according to the summary "Dutch auction" fashion, but after much sparring and bargaining, during which the cheeses are felt, smelt, and tasted. Agreement upon the price for particular lots of cheese is signalized by seller and buyer striking hands, and then,

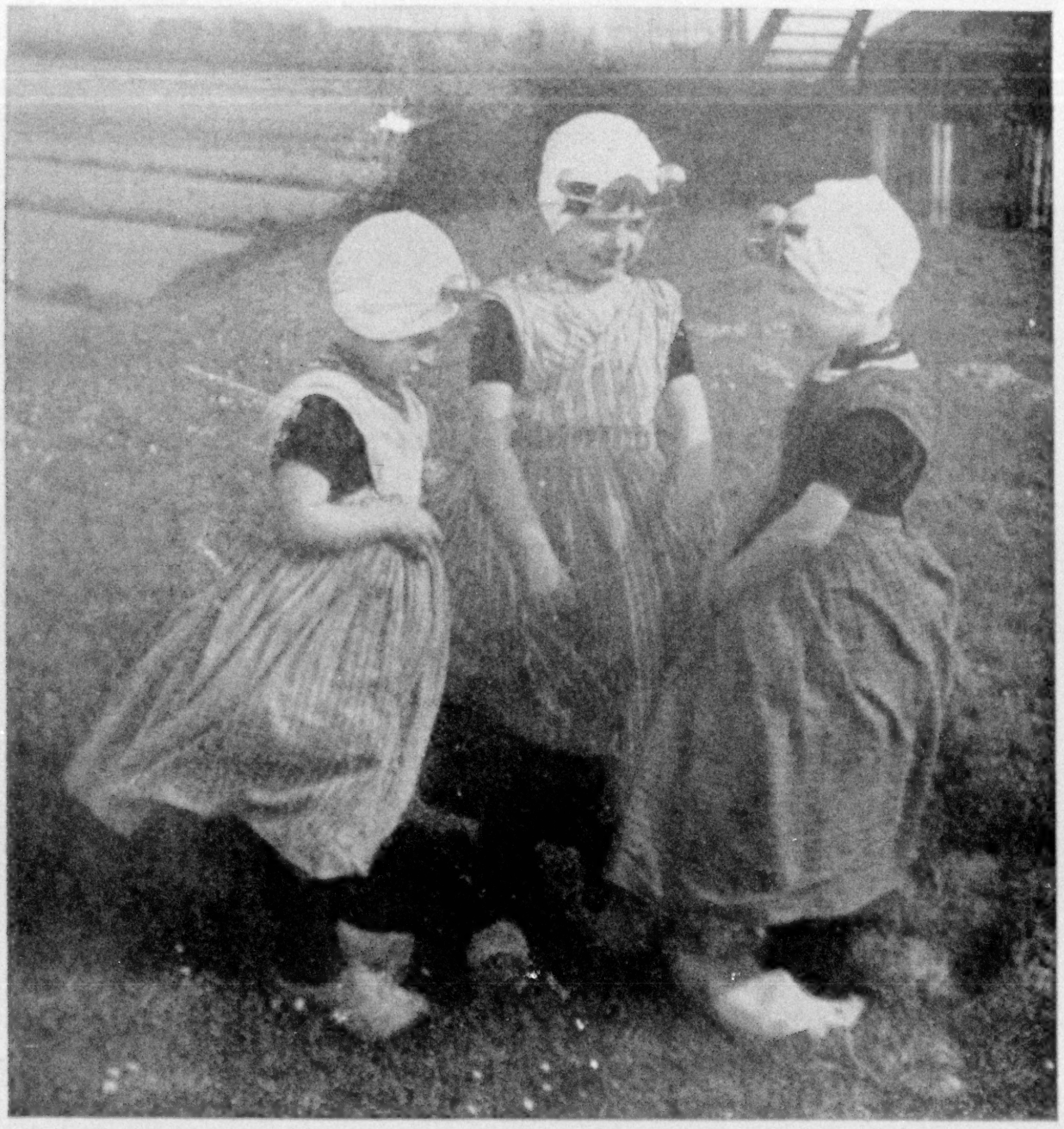


Photo from Hugh M. Smith

ANOTHER VIEW OF THREE OF THE CHILDREN SHOWN IN THE PRECEDING GROUP

the half hour having sounded, the "Kaasdragers" begin their labors, carrying to the weigh-house heaping loads of cheeses on sledlike trays suspended from their shoulders, receiving a check from the master of the scales, and returning their certified fares to the respective owners, who now have a basis for determining the aggregate weight and value of each lot as sold.

The selling and weighing proceed with such expedition that by 11 o'clock the market is practically over, and the removal of the cheeses to the warehouses of the purchasing merchants begins. Soon thereafter the country people depart in their wagons and boats, and when the carillon gives its grand noonday performance the market exists only as a memory.

On the occasion shown in the accompanying photographs nearly a hundred different manufacturers were represented, and the number of cheeses displayed on the ground and disposed of during the market hour was about 100,000.

AN IDEAL FUEL MANUFACTURED OUT OF WASTE PRODUCTS

The American Coal Briquetting Industry

By Guy Elliott Mitchell

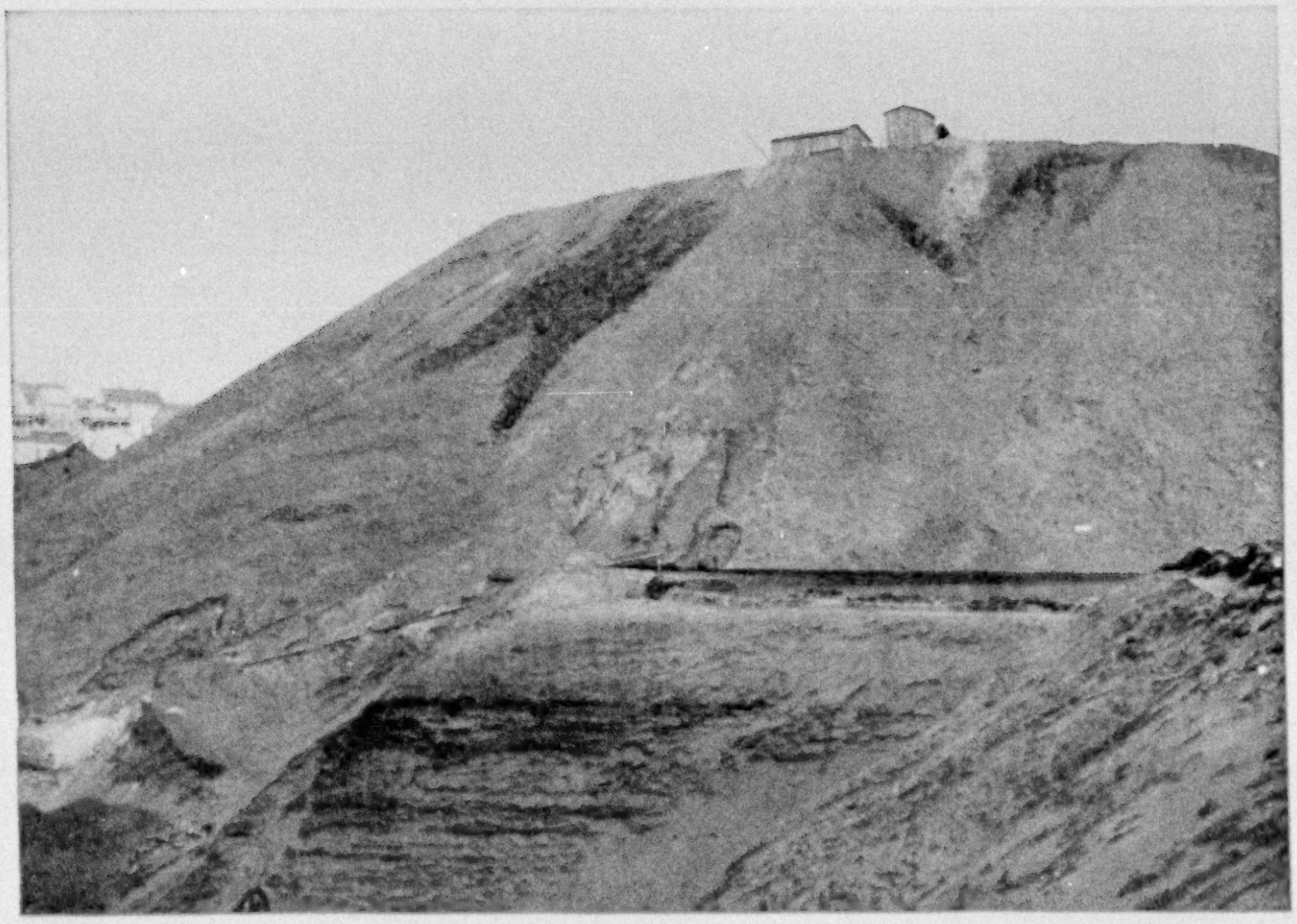
"HOW perfectly formed some of the hills of that range are, lying just to the left of the railroad. They look symmetrical enough to be artificial."

"Well, they do, for a fact. To tell you the truth, they are. They were made by men."

"Made by men? Mound-builders? Why, there are dozens of them; those abrupt slopes are hundreds, almost thousands of feet long—a regular mountain chain."

"True, and they are uniformly the most valuable mountains in existence; but they are, indeed, man-made; at the same time they are waste. They are mountains of solid carbon—coal dust—culm and slack from the mines—millions of tons of it."

More than one traveler has remarked thus on the huge coal-dust hills which break the skyline of the various coal-mining regions. Last year the coal mined in the United States was 445,000,000 tons; but in the process of mining



A HILL CONTAINING THOUSANDS OF TONS OF ANTHRACITE COAL WASTE, OR REJECTED CULM: SCRANTON, PENNSYLVANIA

Probably 200,000,000 tons of anthracite, worth $200,000,000, were lost last year as dust and waste, which, if converted into briquets, as in Germany or France, could have been profitably used. The heating value of this coal dust is even greater than that of the marketed coal. Billions of dollars have been thus wasted in the United States since coal mining began.

XUM

about 40 per cent of the deposits, or about 300,000,000 tons additional, was wasted, and a good proportion of this is represented by coal dust—culm, or slack, as it is called. Most of it is waste; it is either dumped back into the mines as "filling," or it is burned to get rid of it. The amount of such waste since coal-mining began in the United States can be stated only in billions of tons. And the heating value of this coal dust is even greater than that of the marketed coal.

BRIQUETTING AN IMPORTANT EUROPEAN INDUSTRY

In Europe no such destruction occurs. The coal dust is pressed up into briquets, which make a higher grade fuel than the run-of-mine coal. Germany manufactures 17,000,000 or 18,000,000 tons a year of briquets from coal waste—the highest grade fuel she produces. In the United States briquets could be made at the coal-dust piles, from either hard or soft coal, superior to any lump coal, and sold at the mines at a cost of about $1.25 a ton. Yet we pay for our household coal, not so good, from $5 to $8 a ton. Of course the transportation item, either in coal or briquets, is always the greatest cost factor.

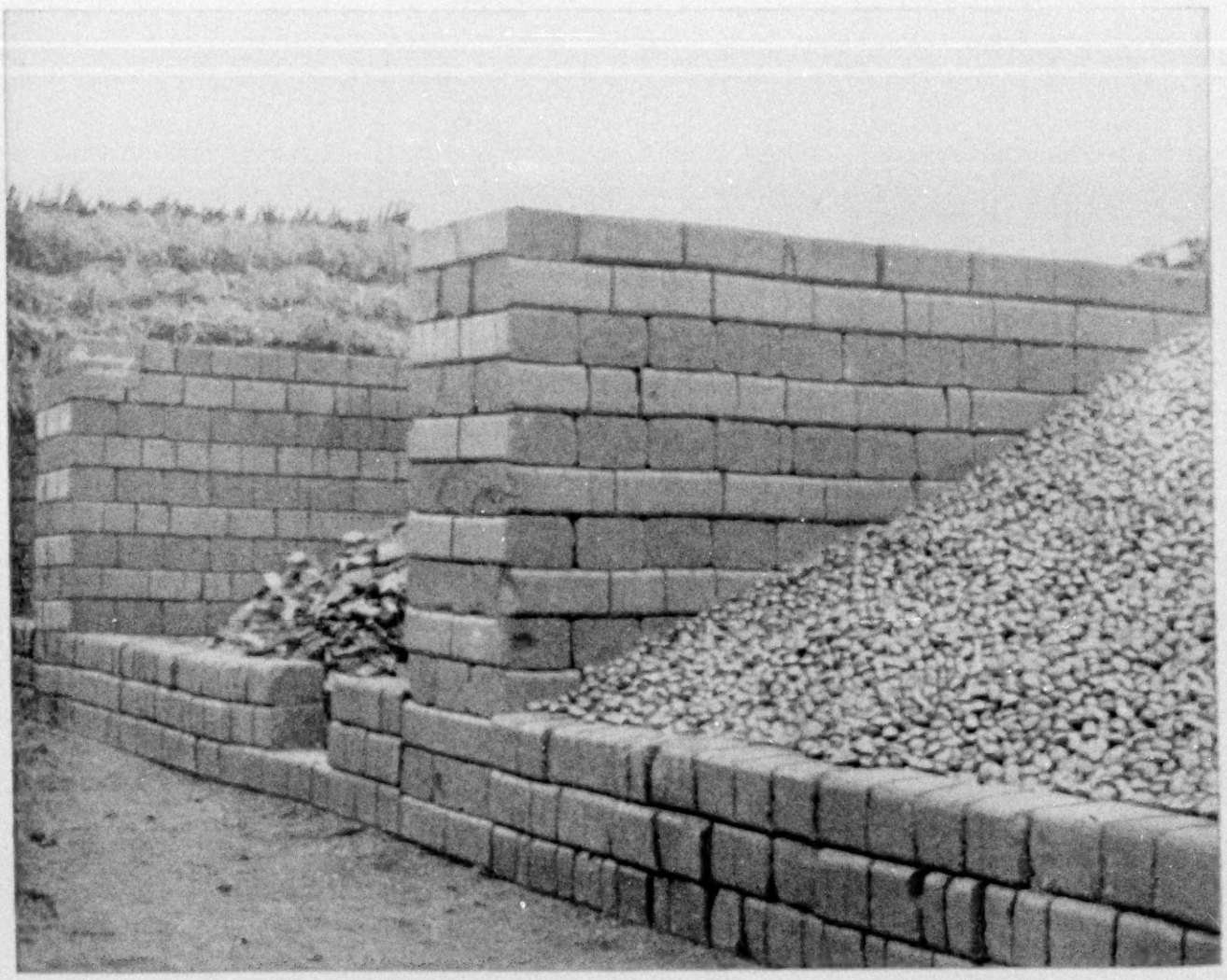
But some of us will yet see the coal briquet in common use in this country. It has already gained a foothold, and, as Edward W. Parker, of the Mineral Resources Division of the Geological Survey, says, it is only a matter of time and education when the briquet will come into general use. There is, he remarks, a plethora of raw material which can be made into briquets, and in the utilization of which one of the greatest steps in the application of conservation principles can be made. In "Mineral Resources" for 1908, Mr Parker made the optimistic statement that the preliminary period of failure and discouragement in the manufacture and use of briquet fuel had apparently passed, and that the industry would soon find itself on a substantial footing. In his last report he notes a marked increase—55 per cent—in the annual production, although the industry is still in its infancy.

However, the output for 1909 was 139,661 tons, valued at $452,697. As many of these briquets were manufactured practically at the point of consumption, this value represents in large measure transportation charges. When comparisons are drawn between the extensive development of the briquetting industry in Europe and the small beginnings in this country, it must be kept in mind that in foreign countries the raw fuel is relatively high-priced. In Germany, where the briquetting industry has been most highly developed, raw coal is not only more expensive, but also of lower grade than the coal of the United States. Mr Parker gives three principal reasons for the holding back of our briquetting industry: first, our large supply of cheap fuel; second, the higher cost of our labor, and third, attempts to exploit secret processes for briquet-making, under which extraordinary claims are made, but which have not proved successful in commercial operation.

The greatest cost of the briquet lies in the binder which must be used to cement the coal dust together. The cost of manufacture should be about 40 cents a ton, but the cost of adequate binding material runs as high and higher than 75 cents for a ton of briquets produced. With asphaltum residuum of the heavier petroleums, water-gas tar pitch and ordinary coal-tar pitch, all excellent binders, available for briquet manufacture, there is no reason for secrecy with regard to the constituency of patented binders.

BRIQUETS MAKE IDEAL FUEL

Briquets make splendid fuel, but the people know little of them. The better educated the public becomes in the use of briquetted fuel the more rapidly will the industry develop, the most pronounced retarding element having been the tendency to exploit secret methods of questionable merit instead of progressing along conservative lines in paths laid out by the experience of European countries. The history of the briquet industry in Europe reveals the fact that every conceivable substance having any claim as a bond has been tried. After practical



LARGE BRIQUET PILES ON A FRENCH RAILWAY; ALSO A PILE OF EGGETTES USED FOR DOMESTIC FUEL

Locomotives which burn briquets emit less smoke, consume less fuel, and attain greater speed than when fed by run-of-mine coal of the best quality

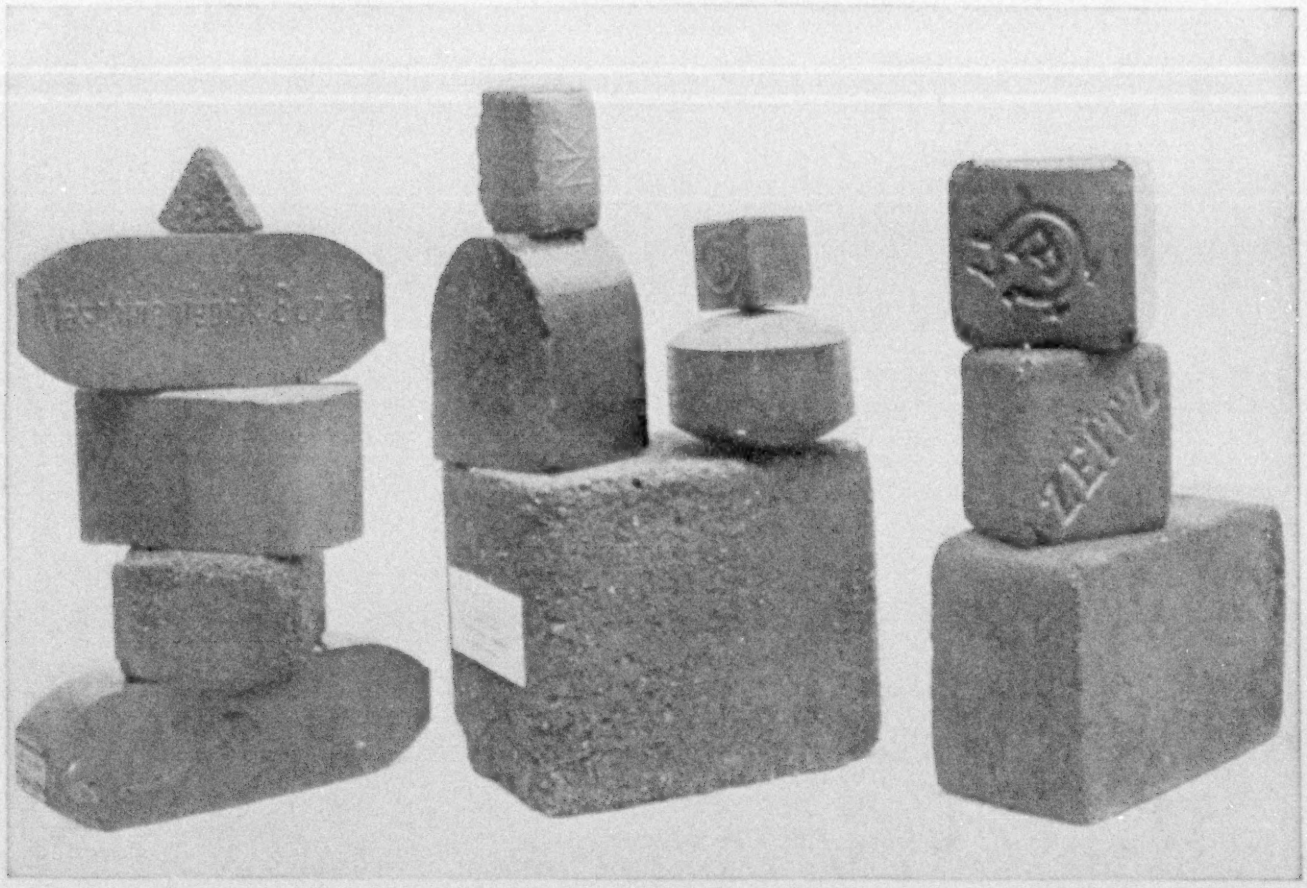
experience, the consensus of opinion has given preference to pitch made from oil or coal-tar. This tar is a by-product obtained in the manufacture of coke in by-product ovens and in the manufacture of gas, either from the destructive distillation of coal or by carburetting water-gas with oil.

Measured in percentages, our briquet production is but an infinitesimal part of our entire fuel production; yet it constitutes the very cream, for the briquet is the fuel ideal, and, as its superiority over raw coal becomes better recognized, the demand for it will force the utilization of today's mine waste. In speaking of the commercial future of the briquet, Mr C. T. Malcolmson, a mining engineer, says in a recent issue of the "Black Diamond":

"If the conservation of natural resources is to pass from the period of agitation to one productive of practical results, the briquetting of coal is one solution of the waste. The agitation for the reduction in smoke is another factor assisting this new industry. We cannot hope to take the high-volatile coals mined in Illinois and make of them, by treatment, a fuel which will be smokeless in burning under all conditions, but there are high-grade, low-volatile coals sold in the Chicago market which, if briquetted, will make a smokeless fuel.

"As a rule these high-grade, low-volatile coals are friable, and the lump coal slacks if exposed.

"The United States government has demonstrated that briquets made from these coals withstand the action of the



SOME OF THE VARIOUS TYPES OF FOREIGN BRIQUETS

Briquets range in size from little fellows no larger than a small hen's egg, intended for domestic use, to blocks considerably larger than an ordinary building brick

weather for almost an indefinite period. Briquets do not deteriorate, either in physical quality or in heat value, in being stored for several years in the open. A briquetting plant established at the mines will allow an operator to produce coal to the maximum of his lump-coal requirement and briquet such of the fine coal as does not find a ready sale. These briquets can be stored and shipped when coal cars are idle to some common distributing point, there to be held in storage until the price warrants their sale."

REMARKABLE RESULTS FROM GOVERNMENT EXPERIMENTS

The government's experiments and investigations with reference to briquets, like other phases of its fuel inquiries, have been productive of astonishing results. Based on these tests made by the Geological Survey and now being continued by the new Bureau of Mines, briquetted coal, for use at least by railway locomotives and steamships, has a bright future. Briquets are shown to have produced greatly increased energy, and, under forced drafts, proved themselves much more nearly smokeless than run-of-mine coal of the best quality. It has, indeed, been confidently predicted that the war vessel of the future will have its smoke problem solved as effectually as has been the smoke question on the firing line since the introduction of smokeless gunpowder.

In 16 comparative test trips on the Atlantic Coast Line Railroad, made under the supervision of the Geological Survey, aggregating 1,984 miles, briquets proved superior on every count. Ton for ton, the briquets ran the cars more miles than did the coal, and ran them faster. The following figures tell the tale:

	Pounds consumed	Car miles run
Briquets	161,980	12,896
Coal	172,700	10,912

Stated another way, it required, to run each car mile, 15.8 pounds of coal, but

only 12.5 pounds of briquets. With briquets employed as fuel on all the railroads of the United States, this would mean a saving of at least 30,000,000 tons of coal annually. The most impressive showing for the briquets, however, lay in the fact that it was possible to secure from them a much hotter fire and consequently greater speed than with coal, and, in these particular practical tests, to make up much lost time. This showing of increased speed is significant in these days when entire railroad routes are being retracked to cut out curves and shorten distances in order to establish faster schedules.

Further U. S. Geological Survey tests, made on Chesapeake and Ohio Railroad engines, showed that the briquet ignited more freely than coal, and therefore got up steam quicker. It made an abnormally hot fire, and, with the engine running at high speed, emitted practically no smoke. A heavy fire could be maintained without danger of clinkering, few ashes resulted in the fire-box, and the cinder deposit was very small, thus indicating almost complete combustion. Incidentally, this would suggest that if railroads burned briquets, fewer if any live coals and cinders would be belched from the engine's smokestacks to start forest fires and cause the destruction of thousands of acres of timber lands every year.

IN EVERY RESPECT SUPERIOR TO COAL

In still further government tests, made in coöperation with the Missouri Pacific, the Michigan Central, the Rock Island, the Burlington, and the Chicago & Eastern Illinois railroads—aggregating 100 locomotive tests—briquets, in almost every instance, showed greater efficiency than natural coal. Certain Oklahoma coal, for instance, gave a boiler efficiency of 59 per cent, but briquets made from the same coal gave an efficiency of from 65 to 67 per cent. Decreased smoke density, the elimination of clinkers, and the apparent decrease in quantity of cinders and sparks are cited as the chief reasons for this higher efficiency—factors which should be interesting to the public as well as to the railroad companies' exchequers.

Other interesting tests were carried on by the Survey with a locomotive mounted at the testing plant of the Pennsylvania Railway Company at Altoona, Pennsylvania, resulting in the same story—favorable to the briquet. In the report on these experiments the following conclusions have been published by the government:

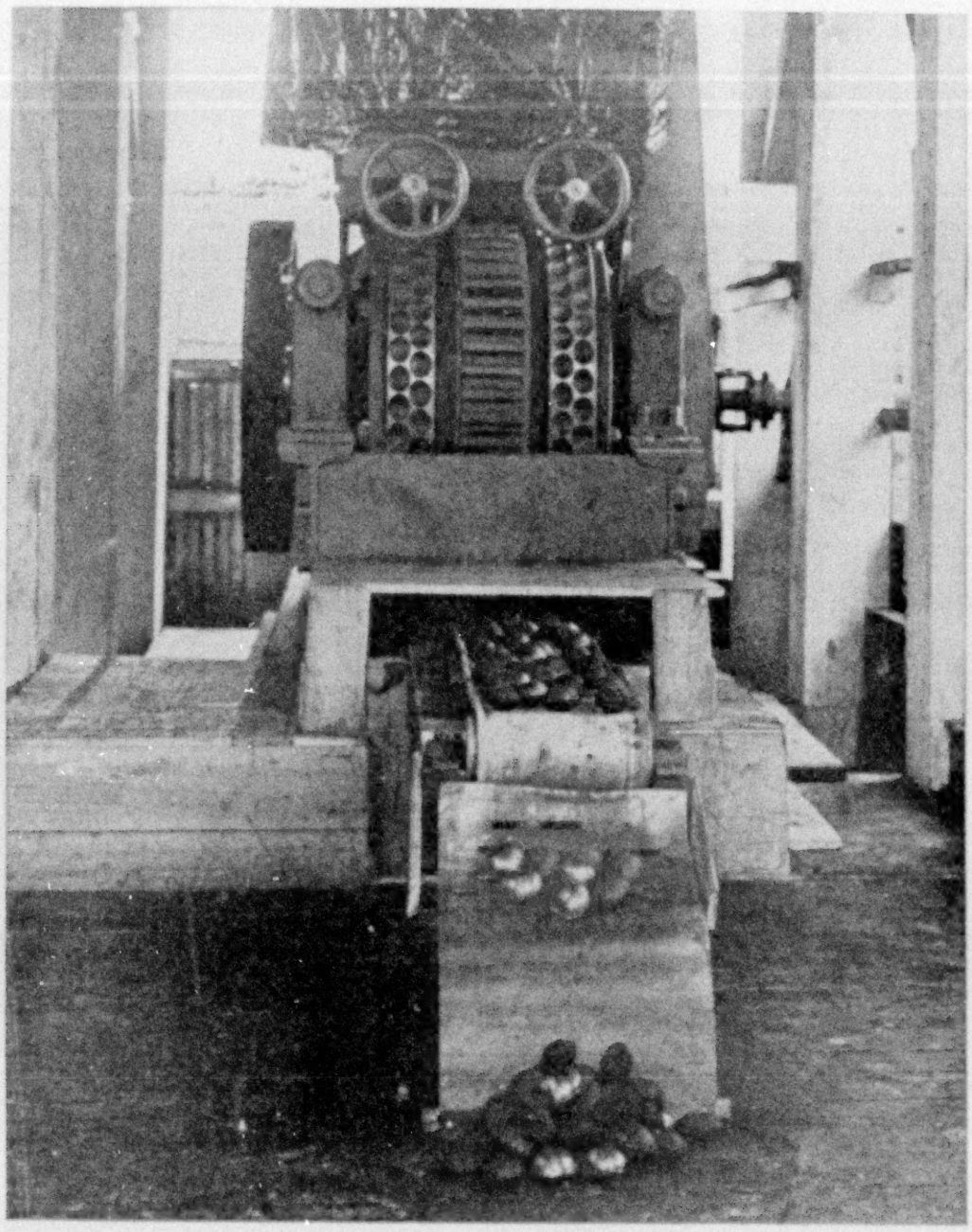
"The briquets made on the government machines have well withstood exposure to the weather and have suffered but little deterioration from handling. In all classes of service involved by the experiments the use of briquets in the place of natural coal appears to have increased the evaporative efficiency of the boilers tested. The use of briquets increases the facility with which an even fire over the whole area of the grate may be maintained. In locomotive service the substitution of briquets for coal has resulted in a marked increase in efficiency, in an increase in boiler capacity, and in a decrease in the production of smoke."

It is especially noted that the briquet, on account of its lack of smoke, may be used to advantage in running in and out of cities. In certain of the tests, for instance, the figures show an average density of smoke for coal stated at 1.7, as against but .62 for briquets.

Similar tests were carried out on the torpedo boat destroyer *Biddle*, with a very great increase in boiler capacity resulting from the use of briquets, which made a much hotter fire than had ever been possible with coal. Never before had the *Biddle* run so fast as during these briquet tests.

BRIQUETS EXTENSIVELY USED ABROAD

In a personal investigation of the briquet industry in European countries, Dr. J. A. Holmes, the present Director of the Bureau of Mines, found this form of fuel in high favor. In Belgium he found that the state railroads used briquets exclusively for passenger service. In Germany the briquet constitutes a



A BRIQUET MACHINE IN THE BUREAU OF MINES PLANT

At this station coal dust is made into briquets by enormous pressure, without the use of any binding material

fuel which, it is stated, can be handled and stored with greater facility and less loss than natural coal; as a steam producer it is most satisfactory and its use conserves the country's resources. In France Doctor Holmes found the briquet being widely used and purchased by the government railroads under definite specifications. The absence of smoke and cinders in traveling on these briquet-using trains was noticeably agreeable.

The Red Star Line steamships, according to a statement in the "Black Diamond," use bituminous briquets from Antwerp to New York, but on the return trip have to burn American soft coal. The opportunity presented for practical comparative tests is an ideal one. From reports on both classes of fuel, better time and at lower cost is made when running on briquets; it is estimated that "nearly one-third of the average coal bill is saved."

OUTLOOK GOOD FOR AMERICAN BRIQUET-MAKING

The conditions in the United States would seem to favor the gradual and

steady advance in briquet-making. The supply of the raw material—coal screenings—is a great and constant one, and the possible supply of binding material is good. Our annual coke production is now about 35,000,000 tons, and an important by-product of coke manufacture is coal-tar, an ideal briquet binder. Until recently most of our coke was made in "beehive" ovens, by which process the by-products are entirely wasted. Great by-product coke ore retorts are now rapidly displacing the wasteful beehives, a recent notable installation being at the United States Steel Corporation's huge plant at Gary, Indiana, and thus large quantities of cheap binding material are becoming available. Moreover, the binder manufacturers and the briquetting industry are showing signs of "getting together." Briquetting Engineer Malcolmson stated recently, in discussing the importance of binding material for briquet manufacture:

"There is no doubt that the successful briquetting of coal depends as much on the specifications and uniformity of the binder furnished as it does on the mechanical operations of the machinery. The consumption of pitch for briquetting purposes so far, in this country, has been so irregular and uncertain that pitch manufacturers have not been disposed to give the distillation of tar the proper consideration. In working out the problems which are always inherent in new propositions, it has been discovered that the ability to put on the market a uniform fuel necessitated a uniform quality of binder. One of the most promising indications of future success in establishing this important industry in the United States is the attitude which has recently been assumed by the leading pitch manufacturers in recognizing the necessity of a distinct product to be known as "briquetting pitch." These manufacturers also recognize the necessity of assisting in every way to establish the briquetting industry by not only spending considerable money in developing a pitch of the requisite specifications, but also placing that pitch on the market at a price which will make the briquetting of coal commercially possible.

A NUMBER OF BRIQUET PLANTS IN PRACTICAL OPERATION

In Mineral Resources for last year, Mr. Parker, of the United States Geological Survey, describes the briquetting plants in active operation. The plants are located in New York, Pennsylvania, Massachusetts, Rhode Island, Indiana, Illinois, Michigan, Iowa, Missouri, Oklahoma, Montana, Washington, Oregon, Texas, and Wisconsin.

The briquets range in size from little fellows no larger than a small hen's egg, intended for domestic use, to blocks considerably larger than an ordinary building brick. They are variously termed "boulets," "eggettes," "carbonets," "patent fuel," "coalettes," and "briquets." The briquet machines have capacities ranging from a few tons to 40 or more tons per hour. The coal or slack is finely crushed and then mixed with the pitch or binder like a pudding, superheated and saturated steam and water being used to obtain a conglomerate of the right consistency, varying with different coals. The material is then forced into the molds and subjected to a heavy pressure of a ton or more to the square inch. Thereupon issues the completed briquet.

HUGE LIGNITE BRIQUETTING MACHINE

A statement of the possibilities of the briquet industry in the United States would not be complete without reference to the promising lignite briquetting experiments being carried on by the Bureau of Mines. At the Pittsburg station of this bureau there has been installed a huge German briquet machine, in which briquets are made by enormous pressure, without the use of binders. The machine develops a pressure capacity of from 14,000 to 28,000 pounds per square inch, and is typical of the plants used in Germany with great success for briquetting brown coal. Tests have already been made with Texas, North Dakota, and California lignites in order to determine

XUM

whether the vast stores of American lignites cannot be briquetted without the use of artificial binders, under the same conditions as prevail in Germany for briquetting brown coal, which is analogous to our lignite. The results from these preliminary tests have been in the main highly satisfactory.

The tests proved that not only can lignite be briquetted, but that the reduction of the moisture incident to the briquetting process increases the heat value of the briquets obtained by from 37 per cent to 54 per cent over that of the raw fuel. This improvement in heat value will be of great importance to a consumer, as a greater efficiency is obtained from the combustion of fuels of high-heat value than from those of lower-heat value. The experiments have also conclusively demonstrated that the briquetted fuel withstands the effect of weathering several months longer than the raw fuel, thus making possible the transportation of the lignite briquets, which is not practicable in the raw fuel, owing to its tendency to crumble and slack.

As a whole, the coal-briquetting industry in the United States gives promise of a fine development in the near future; it should give us a fuel of the greatest value and convenience for both industrial and domestic uses, and there is satisfaction in the knowledge that whatever the growth of the briquet production it means in effect the creation of something out of nothing, since the materials which constitute this fuel are at present a dead waste.

NATIONAL GEOGRAPHIC SOCIETY

THE series of illustrations in color published in the November number of this Magazine has proved so popular that a similar series will be published at least twice in 1911. The next number will contain the address recently delivered before the Society by ex-President Roosevelt, illustrated by many photographs by Mr Kermit Roosevelt. The same number will also contain an unusual series of photographs, showing the immense work being done on the Panama Canal.

The annual dinner of the Society will be held Saturday evening, January 14, at the New Willard. The dinner is in honor of the U. S. Army and of the art of aviation. The principal guests of honor will be Messrs Wilbur and Orville Wright. There will be addresses by President Taft, the German Ambassador the Mexican Ambassador, Major General Leonard Wood, Chief of Staff U. S. Army, and Mr Wilbur Wright. Members desiring to attend should send their applications at once. Price per plate, $5.00.

January 6.—"Arab Life in Tunisia." By Frank Edward Johnson.

January 13.—Annual Meeting, Hubbard Memorial Hall, 5 p. m.

January 13.—"The Methods, the Achievements, and the Character of the Japanese." By Mr George Kennan. Illustrated.

January 20.—"Making Pictures. The Wonderful Development of the Art of Photography and Its Value to Education and Commerce." By Hon. O. P. Austin, Chief of the United States Bureau of Statistics and Secretary of the National Geographic Society. Illustrated with motion pictures.

January 27.—"The Panama Canal." By Col. George W. Goethals, Chief Engineer Panama Canal. Illustrated.

February 3.—"Our Plant Immigrants." By Mr David Fairchild, in charge of Agricultural Explorations of the Department of Agriculture.

February 10.—"The Balkan States." By Mr E. M. Newman. With motion pictures.

February 17.—"The Heart of Turkestan." By Mr William E. Curtis. Illustrated.

February 24.—"The Italy of Today." By Maj. Gen. A. W. Greely, U. S. Army.

March 3.—"The Birds of Mexico." By Mr Frank M. Chapman, of the American Museum of Natural History.

March 10.—"From the Amazon to the Orinoco. The Five Guianas." By Mrs Harriet Chalmers Adams. With motion pictures.

March 17.—"Travels and Experiences in Mexico." By Mr John Birkinbine, President of the American Institute of Mining Engineers. Illustrated.

March 24.—"The Shrines of Greece: Olympia, Delphi, Eleusis, Athens, Mycenæ, Tiryns, Epidauros, and the Island of Crete." By Miss Marion Cock. Illustrated.

March 31.—"The Romance and Grandeur of Spain." By Dr Charles Upson Clark, of Yale University. Illustrated.

April 7.—It is hoped that former Vice-President Charles W. Fairbanks will be able to address the Society on this date on some subject connected with his recent journey around the world.

April 14.—"The Fiords and Fisheries of Norway." By Dr Hugh M. Smith, Deputy Commissioner of the Bureau of Fisheries. With motion pictures.

Diversify Your Investments

THE problem to be solved in making an investment is how to obtain a fair return on money without jeopardizing its safety. Marketability and diversification also are factors to be considered. Experience teaches that it is a good plan to distribute money among different classes of investment, rather than to place it all in any one form of security.

For example, if you were to invest your first thousand dollars in a high-grade railroad bond, the second thousand in a high-grade public utility bond and the third thousand in a preferred stock of high standard, your money would be well spread out in the field of conservative investment. As time went on, or if your immediate financial means permitted, you could still further diversify your holdings, or increase proportionately your interest in the three types of investment suggested.

Let us send you a copy of our circular "Investment Securities," which describes a carefully selected list of

Railroad Bonds — Guaranteed Terminal Bonds
Public Utility Bonds — Equipment Bonds
Preferred Stocks of High Standard

If you have money to invest—no matter how large or small may be the amount—and feel the need of prudent advice, we shall be glad to give you the benefit of our experience in the investment banking business.

Write for Circular No. 447, "Investment Securities."

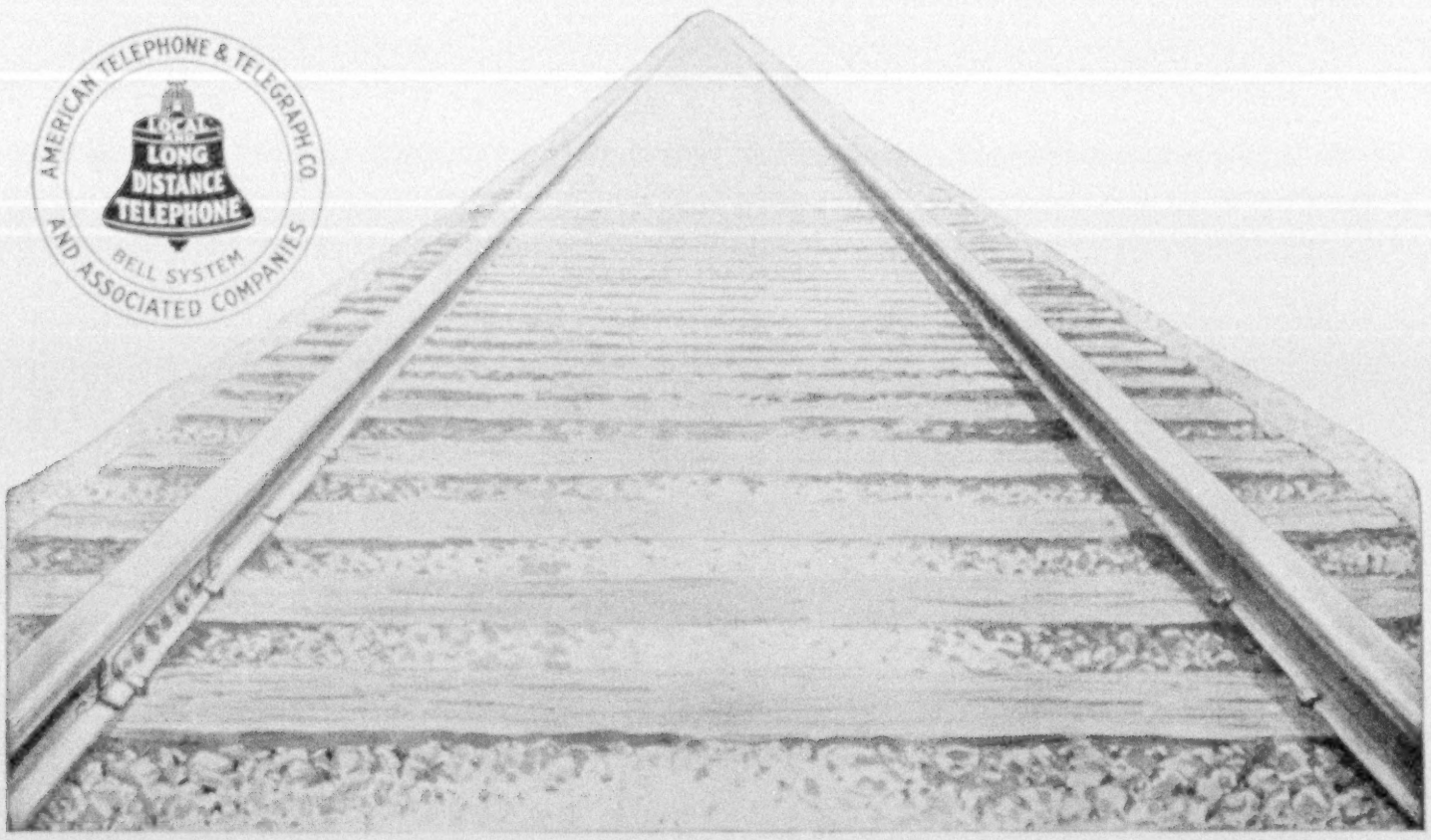
Washington Correspondent:
CHRIS COX DAWSON,
729 15th Street.

Spencer Trask & Co.

43 Exchange Place, New York
Albany, N. Y. Boston, Mass. Chicago, Ill.

Members New York Stock Exchange.

Your courtesy in mentioning the Magazine when writing will be appreciated



"The Clear Track"

Two men a thousand miles apart talk to each other by telephone without leaving their desks.

Two wires of copper form the track over which the talk travels from point to point throughout a continent.

Moving along one railroad track at the same time are scores of trains carrying thousands of passengers. The telephone track must be clear from end to end to carry the voice of one customer.

The Bell system has more tnan ten million miles of wire and reaches over five million telephones. This system is operated by a force of one hundred thousand people and makes seven billion connections a year—twenty million "clear tracks" a day for the local and long distance communication of the American people.

The efficiency of the Bell system depends upon "One System, One Policy, Universal Service."

AMERICAN TELEPHONE AND TELEGRAPH COMPANY
AND ASSOCIATED COMPANIES

Your courtesy in mentioning the Magazine when writing will be appreciated

THIS ADVERTISEMENT WAS WRITTEN FOR THE HOWARD BRUSH CO.
BY GERALD B. WADSWORTH

Why Brushing is Life to the Hair

NATURE feeds your hair with an oil. This natural oil is the hair's life-giving fluid. It flows throughout the entire length of the hair. When the nourishment has been extracted the oil is forced to the outside of the hair by a fresh supply.

Then it becomes waste. It oxidizes or thickens upon contact with the air. Dust collects on it. This coating envelops the hair from root to tip and clogs up the thousands of little outlets.

This stops the necessary flow. The hair is no longer nourished properly. The two little glands (sebaceous glands) at the root of the hair are still producing the oil. The natural channels being blocked, this oil is forced up beside the root. It flows out on the scalp and oxidizes, laying a foundation for dandruff and other troubles.

Brushing the hair frequently and vigorously with a properly constructed hair-brush will do it more good than all the doubtful nostrums ever invented. It removes the impurities in a natural, harmless way.

Howard Brushes are scientifically constructed. Their stiff, penetrating bristles reach through and brush each layer of hair with every stroke. This keeps it clean and gives nature a chance. A Howard Brush will not grow hair on a bald head, but it will enhance the beauty of naturally thick hair and encourage a luxuriant growth in cases where thinness is due to neglect.

The Hair, Its Growth and Hygiene

Is a new presentation of scientific facts regarding the hair. It should be read by every thinking person, because it dispels many of the false impressions that have prevailed. It will be sent free to any one addressing Dept. C.

THE HOWARD BRUSH CO., 15 West 24th Street, N. Y.

MANUFACTURERS OF

Howard Brushes
Best Brushes Made

GODIVA AJAX SAMSON

Your courtesy in mentioning the Magazine when writing will be appreciated

3 desirable 6% Bonds for quick purchasers

Rarely in our experience has it been possible to offer well secured 6% Public Utility Bonds at a price around par. This offering of three such issues is, therefore, unique and affords discerning investors an unusual opportunity to secure

Sound marketable securities at an attractive price

Each issue is the secured obligation of a strong and growing public-service corporation earning net from two to three times interest requirements.

In each case the bonds have been issued for extensions and improvements to facilitate the handling of increasing business which should result in increased earnings.

We have prepared a special four-page circular describing these issues, which will be promptly mailed to all who write for it.

Ask for Circular A. N.-52

N.W. Halsey & Co.

Bankers and Dealers in Government, Municipal, Railroad, and Public Utility Bonds.

NEW YORK
49 Wall St.

CHICAGO
152 Monroe St.

PHILADELPHIA
1421 Chestnut St.

SAN FRANCISCO
424 California St.

LAST August we recommended and sold to our clients a 7 per cent Cumulative Preferred stock at par with a 40 per cent bonus in Common stock. That Common stock is now bid $90 a share.

We have at the present time the following issues:

A 6 per cent bond at par carrying 50 per cent bonus in Common stock.

A 6 per cent Cumulative Preferred issue at par—50 per cent bonus in Common.

A 6 per cent Cumulative Preferred issue at a small premium with 35 per cent in Common.

Circulars to *individual* investors on request

Swartwout & Appenzellar

Bankers and Members N. Y. Stock Exchange

44 Pine Street New York

"ETONE"

"All-silk" Turkish Towels

Here is what we consider the pink of perfection in bath towels—A towel that makes the bath an absolute delight; one that generates more electricity than an electric battery; one that is hardly moist after using; one that is guaranteed to outwear six ordinary cotton or three linen towels; every thread of it warranted to be pure silk, yet costing no more than fine linen or cotton towels.

These "ETONE" "ALL-SILK" Towels are sold in sealed packages only or boxes for the larger ones.

In sealed packages:	Each
Face Cloths, size 12 x 12	$0.25
Baby Bath Towels, size 20 x 36	0.75
Regular Bath Towels, size 23 x 46	1.25

In boxes:	Each
Special Bath Towels, very heavy, 23 x 48	$2.25
Extra Large Bath Towels, 27 x 54	2.75
Bath Sheets, 50 x 68	5.00

F. MOSS & CO., Manufacturers
495 Broome Street, New York
Dept. B

Your courtesy in mentioning the Magazine when writing will be appreciated

THE ROYAL MAIL
Steam Packet Company

Winter Cruises TO THE WEST INDIES

"The Balmy Isles of Romance"

PANAMA-COLOMBIA-VENEZUELA

3 Cruises de Luxe

BY THE
Magnificent New Twin-Screw S. S.
"AVON" 11,073 TONS

The only steamer cruising in the West Indies specially constructed for service in the Tropics

Sailing from New York

JAN. 21—27 Days . $140 and Up
FEB. 18—32 Days . $150 and Up
MAR. 25—19 Days . . $85 and Up

BERMUDA
11-Day All-Expense Tours—$55 and UP
Available to Dec. 31, including 7 days' hotel, shore excursions, etc.

CUBA
Weekly Service to Antilla (Nipe Bay)
TOURS, $90 and UP

Visiting Bermuda, Santiago, and Camaguey, returning via Havana or Jamaica.

JAMAICA, PANAMA
TRINIDAD, BARBADOS, etc.

Tours by Company's regular mail steamers, 6,000 tons; excellent cuisine, orchestra.

SANDERSON & SON 21-24 State Street New York
149 La Salle Street, Chicago
W. H. EAVES, N. E. P. A., 200 Washington St., Boston

For Winter Tours in Summer Climes Consult

"Cuba A WINTER PARADISE"

a profusely illustrated 80-page booklet with six complete maps, also 72 views illustrative of this wonderful Island. Sent post-paid on receipt of 4c in stamps.

FRANK ROBERTS, General Passenger Agent
UNITED RAILWAYS OF HAVANA
52 Broadway, Room 212a. - - New York

TRAVELERS' CHEQUES

of the AMERICAN BANKERS ASS'N

World-Travelers Carry "A.B.A." Cheques

and tell how *convenient* and *available* they are in all countries. Hotels, railroads, steamship lines and others who deal with travelers accept these cheques at face value in payment of accounts. Use them At Home and Abroad. Issued in $10, $20, $50 and $100.

Descriptive Booklet Free on Request

BUY THEM FROM YOUR OWN BANKER
OR IF MORE CONVENIENT APPLY TO
BANKERS TRUST COMPANY, 7 WALL ST., NEW YORK CITY

Your courtesy in mentioning the Magazine when writing will be appreciated

A mile deep, miles wide, & painted like a sunset

That's the Grand Canyon of Arizona

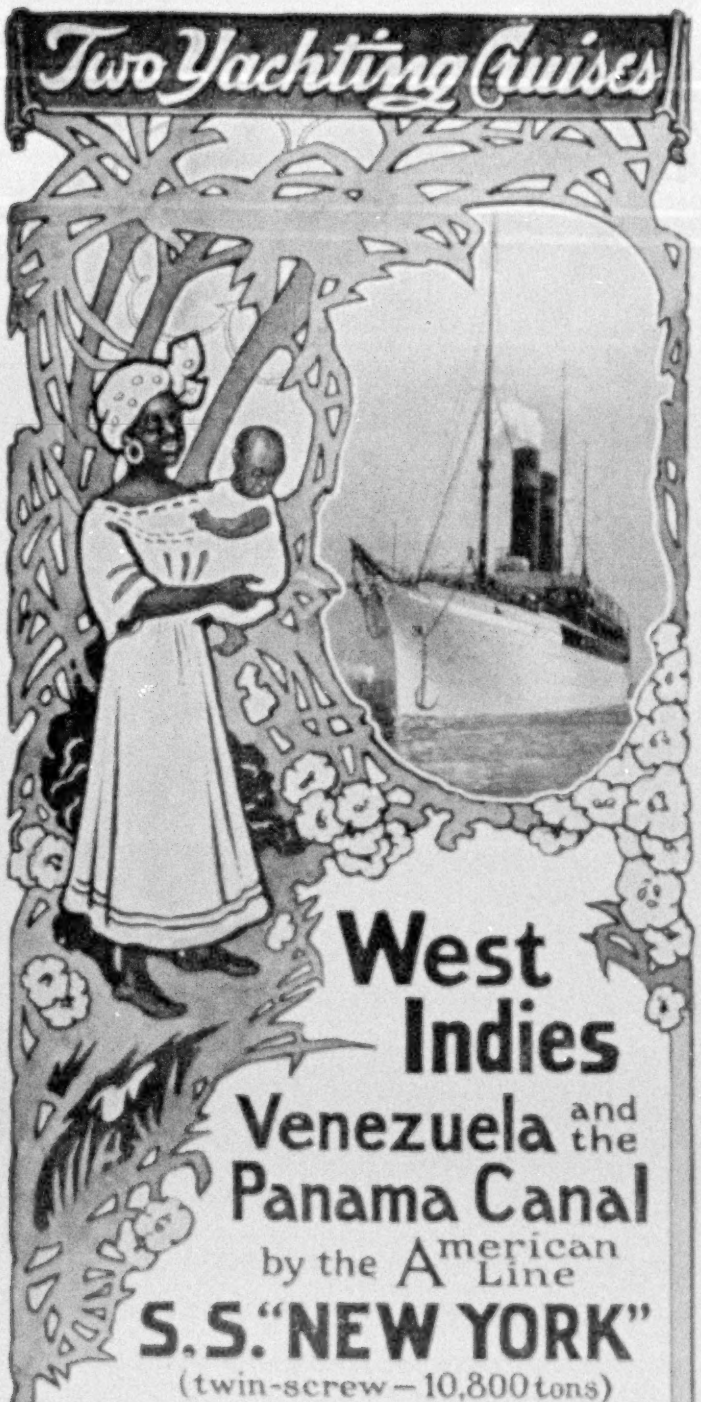
You can go there in a Pullman to the rim at El Tovar, en route to Sunny California on the train of luxury

The California Limited

For art booklets of the train and trip address
W. J. Black, Pass. Traffic Mgr.
A. T. & S. F. Ry. System,
Railway Exchange, Chicago

Santa Fe
All the way

Your courtesy in mentioning the Magazine when writing will be appreciated


Two Yachting Cruises

West Indies

Venezuela and the Panama Canal

by the American Line

S.S. "NEW YORK"

(twin-screw—10,800 tons)

Leaving New York

January 28 & March 4, 1911

31 DAYS EACH

$150 AND UP

EQUIPPED WITH

Wireless, Submarine Signals, Swimming Pool, Electric Fans in Every Room, Dark Room, Motor Launches, Orchestra, etc.

A luxurious sea voyage of 6820 knots, affording 294 hours ashore. Optional excursions, including across the Isthmus, across Cuba, along the Canal Route, etc.

Send for Further Particulars to

PLEASURE CRUISE DEPT. 9 BROADWAY NEW YORK

Or Boston, Chicago, Minneapolis, Montreal, New Orleans, Philadelphia, San Francisco, Seattle, St. Louis, Toronto, Washington, and Winnipeg.

INDEPENDENT

AROUND-THE-WORLD TRIPS $618

Tickets Good for 2 Years

BY THE

North German Lloyd

Twin Screw Steamers. Unusual facilities combining every comfort and luxury. Cabins are roomy, airy and light. Every invention contributing to the safety of passengers. Unusually low rates to Australia, New Zealand and Tasmania via Europe and Suez Canal.

Travelers' checks good all over the world

Write for "Around the World" booklet K.

OELRICHS & CO. Gen. Agts.

5 Broadway, New York

HONOLULU AND THE VOLCANO

THE TRIP MOST COMPELLING and worth while, excelling all others for grandeur, beauty, and pleasure. And this splendid trip can be made in two weeks and a day from San Francisco, by sailing on S.S. SIERRA (10,000 tons displacement). The Volcano of Kilauea, the largest in the world, is tremendously active just now, and a few quick dispatch trips have been arranged. Never before has it been possible to make this desirable trip with such speed and comfort, and the price is low, $110, first class, from San Francisco to Honolulu and back, and $41 for side trip from Honolulu to volcano, including rail and auto to Kilauea; hotel at Hilo; also Volcano House. No other trip compares with this. Be sure to visit the islands and DO IT NOW, while the volcano is active. S. S. SIERRA sails Nov. 12, Dec. 3, Dec. 24. Write or wire.

OCEANIC S. S. CO.,

673 Market Street, San Francisco.

12th Year

IN THE ORIENT

SMALL PARTIES

JANUARY 25, FEBRUARY 18

Prof. Albert E. Bailey conducts for the sixth time.

H. W. Dunning & Co.

109 Congregational House, Boston, Mass.

SOUTH AMERICA

COOK'S next semi-annual Tour *de Luxe* leaves New York January 28, 1911, visiting Jamaica, Panama, Peru, Bolivia, Chile, via Trans-Andine R. R. to Argentina, Uruguay, Brazil, Barbados. A novel and comprehensive tour of 14 weeks.

THE ORIENT Seven Tours to Egypt, the Nile, and Bible Lands, during January, February, and March. 44th Annual Series.

ROUND THE WORLD Last departure of season, January 7, Eastbound.

Illustrated Programmes from

THOS. COOK & SON

NEW YORK BOSTON PHILADELPHIA
CHICAGO SAN FRANCISCO ETC.

Cook's Travelers' Cheques are Good All Over the World

Your courtesy in mentioning the Magazine when writing will be appreciated.

LET us send you this booklet about Business Stationery. It is neither long enough to be tiresome nor biased enough to be irritating. It attempts to set forth in a sane way a little "inside information" about business stationery that every man ought to know. With this we will include a sample book of Old Hampshire Bond, which is probably biased, for it contains specimens of the paper printed, lithographed and die stamped with some fine examples of modern letter-heads. These should enable you to settle for yourself, practically and intelligently, the question of business stationery, which you must eventually do.

Hampshire Paper Company

The only paper makers in the world making bond paper exclusively

South Hadley Falls, Mass.

Cherry Blossom Tour Through Japan

China and Korea—thence via Trans-Siberian Railway through Russia—or directly home from China—leaving San Francisco March 2.

Egypt and Holy Land

Three trips for Egypt, the Nile, Holy Land, Greece, and Turkey, leaving New York January 11 and 25 and February 8.

Panama Canal

Twelve trips to the Panama Canal, Jamaica, Cuba, and the Spanish Main, during January, February, and March.

MORE than thirty years' experience in providing the highest class of tours to the traveling public has placed at our command special facilities. These enable us to offer a method of travel both thorough and comfortable. All tours are personally escorted, thus relieving you of the petty annoyances incident to travel, such as tickets, baggage, carriages, hotel accommodations. Our offices also offer excellent facilities for independent travel to all parts of the world.

Limited Party Tours Reservations are now being made for Winter and Spring Tours to **California, Florida, Mexico, and Around the World.** Booklets ready now. Which may we send you?

Raymond & Whitcomb Co.,
Established 1879

306 Washington St., Boston
1005 Chestnut St., Philadelphia
225 Fifth Ave., New York
Oliver Building, Pittsburg

Please detach and fill in blank and send to the Secretary

Recommendation for Membership in the

NATIONAL GEOGRAPHIC SOCIETY

The membership fee includes subscription to the National Geographic Magazine

DUES: Annual membership in U. S., $2.00; annual membership abroad, $3.00; Canada, $2.50; life membership, $50. Please make remittances payable to National Geographic Society, and if at a distance remit by N. Y. draft, postal or express order.

_____ 191

To the Secretary, National Geographic Society,
Washington, D. C.:

I nominate _____

Address _____

_____

for membership in the Society. _____

_____
(Write your address)

Your courtesy in mentioning the Magazine when writing will be appreciated

Dog Teams on the Streets of Antwerp, Belgium

AN EXCEPTIONAL GIFT BOOK FOR YOUNG OR OLD

Scenes From Every Land

(SECOND SERIES)

¶ Send your orders now and we will make deliveries during the holidays, with your card enclosed.

By GILBERT H. GROSVENOR

THE volume contains about 300 illustrations printed on the best of paper, is sewed by hand, and bound in red cloth with an attractive design in three colors. The majority of the illustrations have appeared in the National Geographic Magazine during the last five years, but a large number have not been previously published. Considerable descriptive matter is printed under the pictures. The book also contains a list of about 1,000 of the most useful books of travel and works descriptive of natural history, gazetteers, atlases, etc. Persons ordering more than one copy can have the volumes sent to different addresses, if desired.

CUT ON THIS LINE

NATIONAL GEOGRAPHIC SOCIETY,
WASHINGTON, D. C. _____, 1910.

Please send _____ copies of "SCENES FROM EVERY LAND," bound in _____,

for which I enclose herewith _____ dollars.

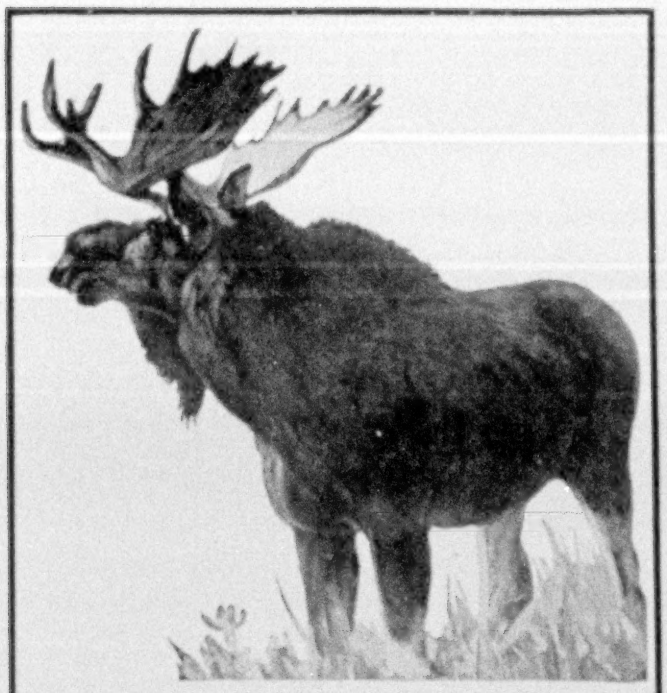
NAME _____

STREET ADDRESS _____

CITY AND STATE _____

Bound in Red Cloth, three-color design, $1.00
Bound in Leather, $2.00, De Luxe Edition

12-10



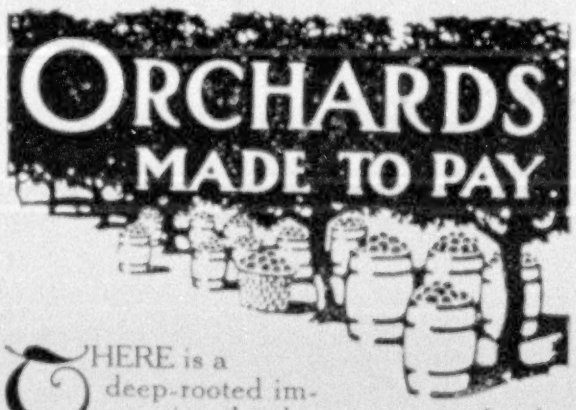
Let Us Tan Your Hide

And let us do your head mounting, rug, robe, coat, and glove making. You never lose anything and generally gain by dealing direct with headquarters.

We tan deer skins with hair on for rugs or trophies, or dress them into buckskin glove leather. Bear, dog, calf, cow, horse, or any other kind of hide or skin tanned with the hair or fur on, and finished, soft, light, odorless, moth-proof, and made up into rugs, gloves, caps, men's and women's garments when so ordered.

Get our illustrated catalog, which gives prices of tanning, taxidermy, and head mounting; also prices of fur goods and big mounted game heads we sell.

THE CROSBY FRISIAN FUR COMPANY,
576 Lyell Avenue, Rochester, N. Y.



THERE is a deep-rooted impression that because an orchard is old, it's on its last legs, and what's the use of bothering with it. There's every use!

Ten chances to one, we can, with our right kind of pruning, spraying, and feeding, turn your orchard into a nice little dividend-payer.

Time and time again the increased profits on the first year's crop have more than paid for our work.

Send for one of our inspectors. He will tell you the facts about your orchard. Want our Booklet?

Munson-Whitaker Co.

Commercial and Landscape Foresters

Boston, 624 Tremont Bldg. New York, 824 4th Ave. Bldg.
Chicago, 304 Monadnock Bldg.

All the plates used in
The NATIONAL GEOGRAPHIC MAGAZINE
are made by
The GILL Engraving Company
140 Fifth Avenue New York

HOLDEN'S, 25 W. 23d St.

Near 5th Avenue and Madison Sq., New York

BIRDS ANIMALS FISH

PARROTS

African Gray Parrots—Greatest Talkers
$25, $30, $40, $50, $75, $100, $500

Contralto Canaries

Soft, Low Warblers, $8, $10, $15, $20, $25

"Holden's Book on Birds," 1910—all about feeding, care, singing—mailed for 12 cents in stamps.

HIGGINS'

- DRAWING INKS
- ETERNAL WRITING INK
- ENGROSSING INK
- TAURINE MUCILAGE
- PHOTO MOUNTER
- DRAWING-BOARD PASTE
- LIQUID PASTE
- OFFICE PASTE
- VEGETABLE GLUE, ETC.

Are the finest and best Inks and Adhesives

Emancipate yourself from the use of corrosive and ill-smelling inks and adhesives and adopt the Higgins Inks and Adhesives. They will be a revelation to you; they are so sweet, clean and well put up. At Dealers Generally

CHAS. M. HIGGINS & Co., Mfrs.
Branches: Chicago, London.
271 Ninth Street, Brooklyn, N. Y.

RAD-BRIDGE

Registered at Pat. Office LONDON · WASHINGTON · OTTAWA.

BRIDGE WHIST ACCESSORIES

"THE STANDARD OF THE BRIDGE WORLD"

CLUB LINEN PLAYING CARDS. Design of back fine hem stitched linen. Patented. Red, blue, brown, and green. 25c. pack. Gold edge, 35c. Samples.

SILK VELOUR PLAYING CARDS. Latest, "It's a beauty." Same quality, size, colors, and price as our famous club linen card: only difference design of back. Samples.

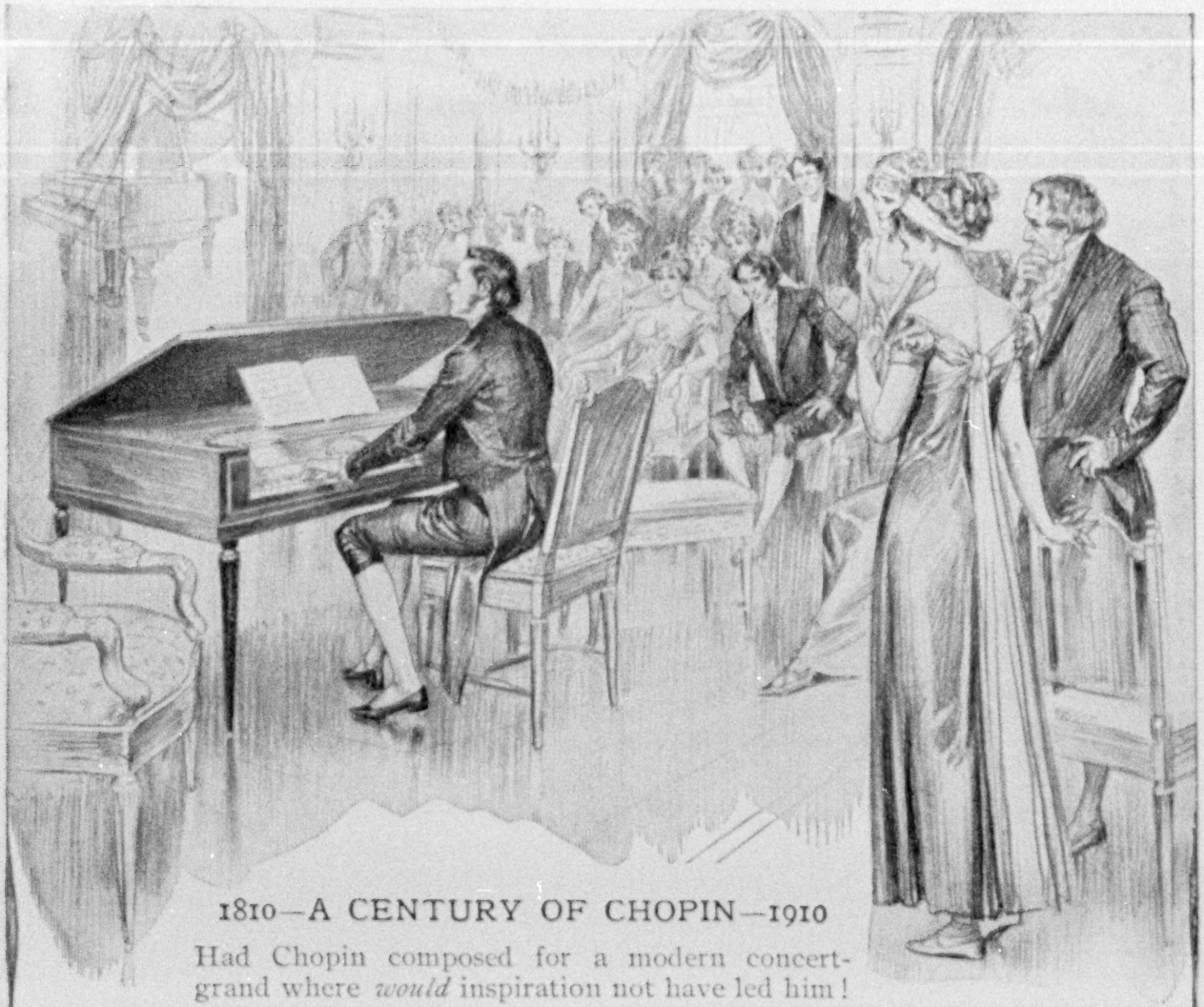
LIFE'S BRIDGE PAD. 26 Cupid pictures by "Life" artists in pad of 50 sheets. Space for more than 150 rubbers. 25c. per pad. $2.50 per dozen. Sample.

"RAD-BR-IDGE," THE STERLING MARK on Bridge accessories the world over. Illustrated catalog free. Ten cents in stamps (less than cost) secures our handsome sample wallet in addition.

"RAD-BRIDGE" GOODS ARE SOLD by first-class dealers everywhere, or will be sent direct, carriage prepaid, on receipt of price.

DEPT. G, RADCLIFFE & CO., 144 PEARL ST., NEW YORK

Your courtesy in mentioning the Magazine when writing will be appreciated



1810—A CENTURY OF CHOPIN—1910

Had Chopin composed for a modern concert-grand where *would* inspiration not have led him!

To know the "greater Chopin", to realize how ingenuity may glorify genius, one must hear the Chopin of

The Baldwin Piano

Here are possibilities of tone-color such as only the composer of the "Ballads" could conjure. Immensity of tone, also, a *pianissimo* that is but a whisper, a *forte* overwhelming by contrast, so beautifully shaded are the gradations.

With Baldwin-tone, de Pachmann, authoritative Chopin-Player, reaches heights denied by the limited keyboard of Chopin's day.

Highly-developed qualities endearing the Baldwin to the tone-poets of the piano give it an equally royal place in the regard of cultivated amateurs.

THE BOOK OF THE BALDWIN PIANO will be sent free upon request.

The Baldwin Company

CINCINNATI

Chicago, 262 Wabash Ave. | New York, 8 E. 34th Street | St. Louis, 1111 Olive Street | San Francisco, 310 Sutter Street

Indianapolis, 18 N. Penn'a St. | Louisville, 425 S. Fourth Ave. | Denver, 1626 California St.

Your courtesy in mentioning the Magazine when writing will be appreciated

A Trio of Travel Treats

WE are convinced that you should have in your library the three splendid volumes of travel from the graphic pen of Mr. William Seymour Edwards, well known to you as a member of the National Geographic Society, and therefore make you a special offer of the books, carefully packed and express prepaid anywhere in the United States, for $5.00.

On the Mexican Highlands

By WILLIAM SEYMOUR EDWARDS

100 Illustrations *$1.75 Postpaid (U. S.)*

A most interesting and intimate descriptive of that wonder country, the Treasure House of the World, Old Mexico, its ancient customs and quaint people.

Through Scandinavia to Moscow

By WILLIAM SEYMOUR EDWARDS

100 Illustrations *$1.75 Postpaid (U. S.)*

Not to travel at leisure through that part of Europe, so full of romance and legend, with such a writer is an opportunity lost indeed. Mr. Edwards is an American who looks with seeing eyes on the conditions confronting him in the lands of the North.

In To the Yukon

By WILLIAM SEYMOUR EDWARDS

100 Illustrations *$1.75 Postpaid (U. S.)*

This book was posted in the Carnegie Library high among the honor list of the dozen most called for and frequently read of the year. Mr. Edwards takes the reader into our vast Northwest, and so absorbing is his style that one seems to be actually traveling over the country with him.

JENNINGS & GRAHAM, Publishers, Cincinnati, Ohio

Your courtesy in mentioning the Magazine when writing will be appreciated

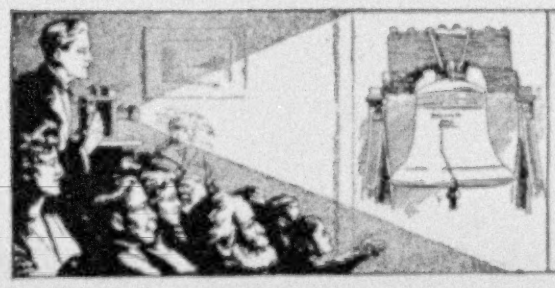
White Rock

"The World's Best Table Water"

From America's Most Famous Spring

Waukesha, Wis.

Put up only in NEW
Sterilized Bottles



The Improved Post Card Projector

Our Post Card Projectors are made on a new and improved system covered by our own patents and, being built scientifically, are superior to others. They show book illustrations as well as post cards; the image is sharp and in natural colors. Some of our projectors show both post cards and lantern slides. Fifty styles of projectors and magic lanterns for parlor, church and school use. Lists free.

Prices, $4.50, $13.50, $25.00 and $60.00.

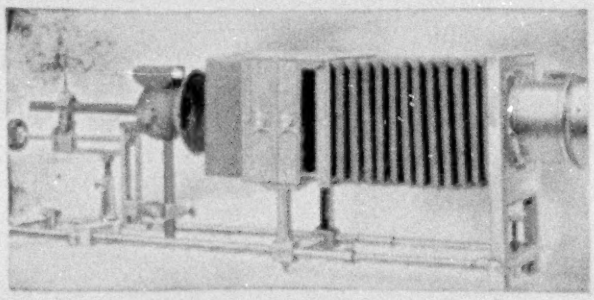
WILLIAMS, BROWN & EARLE, Inc.,
Dept. 17, 918 Chestnut Street, Philadelphia, Pa.

WONDERFUL LANTERN SLIDES

I have acquired the sole right of manufacture and sale of Lantern Slides from the negatives taken by Professors ELLSWORTH HUNTINGTON, of Yale University, and GEORGE SVERDRUP, of Minnesota, and others.

The photographs illustrate all phases of Geography, including geological structure, topography, vegetation, architecture, and antiquities, and the various types of inhabitants. The collections are especially strong in illustrations of daily life and occupations. They number about 3,000 and include practically all the countries of Central and Western Asia, namely, Syria and Palestine, the borders of Arabia, Asia Minor, Armenia, Persia, Transcaspia, Russian Turkestan, Afghanistan, Chinese Turkestan, the Himalayas, Little Tibet, and Northern India, together with the Philippines, China, Japan, and Europe. They are valuable for use in geography or history classes, in Sunday schools, or in clubs where foreign countries are studied. If desired, slides may be had colored true to nature by expert artists. Send for catalog.

W. C. IVES, Mystic, Conn.



Stereopticons and Lantern Slides

adapted to the Home, the Church, the School, and the Lecture Hall.

To Travelers and Lecturers we offer unsurpassed facilities in lecture illustrating from a collection of professionally made, high quality negatives covering all the principal countries of the world.

Ask full information of Dept. N.

Underwood & Underwood

5 W. 19th Street, New York

Imported Norwegian Bear Dogs

Imported Irish Wolfhounds, Bloodhounds, Foxhounds, Cat Cougar, and Lion Hounds. Forty-page illustrated catalogue, four cent stamp.

ROOKWOOD KENNELS, Lexington, Ky.

SPRATT'S

Meat Fibrine and Cod Liver Oil

Were the only DOG CAKES used by Lieutenant Shackleton on his successful dash to the South Pole.

All recent Arctic and Antarctic expeditions have carried SPRATT'S BISCUITS—an absolute proof of their sustaining value for vigorous work.

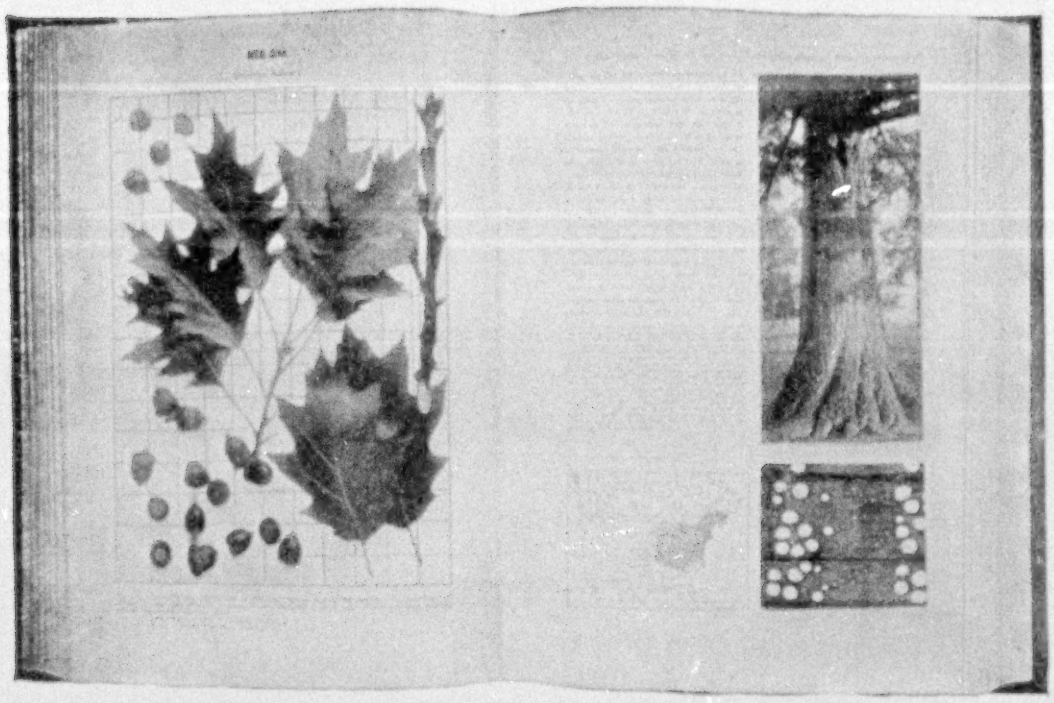
Send stamp for "Dog Culture," which contains much valuable information.

SPRATT'S PATENT, Ltd.

Factories and Chief Offices at Newark, N. J.

Depots at San Francisco, St. Louis, Chicago, Cleveland, and Montreal, Canada.

Your courtesy in mentioning the Magazine when writing will be appreciated



Handbook of Trees

By Romeyn B. Hough

This work shows the fresh leaves, fruits, winter branchlets and barks of the various trees, with the vividness of reality, carefully photographed to a scale. (*See lines in illustration. They indicate square inches.*) Distributions are indicated by small individual maps. Photo-micrographs show wood-structures. With the book even a child can identify the trees and learn about them.

AMERICAN WOODS. By Romeyn Beck Hough.
This work is *illustrated by actual specimens* and has won for its author the special Elliot Cresson gold medal, awarded by the Franklin Institute of Philadelphia for particularly meritorious work.

LEAF KEY TO THE TREES. By Romeyn Beck Hough.
A compact pocket-guide in flexible covers. Very convenient to carry in pocket or hand-bag when you go afield.

Preparations of Woods for Stereopticon and Microscope, Views of Typical Trees, showing habits of growth, leaves, flowers, fruits, etc. Just what you want for illustrating talks on trees.

Write for circulars, stating which subjects interest you most.

ROMEYN B. HOUGH CO., Lowville, N. Y.

A HINT TO PUBLISHERS

This clipping shows what appeals to readers.

EVERYBODY NEEDS MORE MAPS

THERE is nothing that gives so much and such definite information as does a map—if it is a good one. Innumerable books are published annually that would be the better for less of description and pictures and more of maps, but there seems to be a general impression among the publishers that even a single map is required only in books distinctly of travel or, rather, of exploration, and even for those the map is too often inadequate or it is so inserted as to be with difficulty compared with the reading matter. In all histories maps should abound, but from many they are altogether lacking.

Write to us concerning any question of Maps, Color Work, Engraving, and general printing. Our work in all of these lines is of a very high quality.

THE MATTHEWS-NORTHRUP WORKS
NEW YORK BUFFALO CLEVELAND

TEACHERS OF GEOGRAPHY

We take pleasure in announcing the publication of a remarkably clear, comprehensive, and suggestive

OUTLINE STUDY IN GEOGRAPHY

By MAUD E. KINGSLEY

The Geography Outline suggests a new method of teaching this important subject, and it can be used with any text-book of geography.

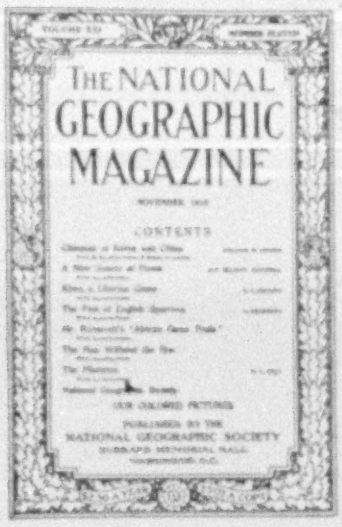
Miss Kingsley is an expert in analysis and outlining. Her outlines in Literature, Latin, and United States History have had a phenomenal success. The Outline in Geography is especially fine. It will commend itself to every teacher of the subject as pedagogical and practical.

Miss Kingsley's work saves the time of the teacher, suggests helpful methods, shows the pupil how to approach the subject, and gets him thoroughly interested.

We confidently commend this book to teachers and classes in Geography everywhere.

Bound in Boards, Cloth Backs, 37 pages, Price, 25 cents

THE PALMER COMPANY
120 Boylston Street Boston, Mass.



¶ The National Geographic Magazine is the closest link between the producer and thousands of discriminating buyers, who want the best and have the wherewithal to pay for it.

RATES AND CIRCULATION STATEMENT OF THE MOST UNIQUE PUBLICATION IN THE MAGAZINE WORLD.

The National Geographic Magazine

WASHINGTON, D. C.

The Geographic goes into the home in the most intimate way. Every member owns a part of it, and its object is to give to the layman in text and graphic illustration a vivid presentation of Geography, based on the great physical features of the earth, on which depends all civilization, customs, avocations, sciences, and literature. Thus it becomes of absorbing interest.

Why It Is Unique.

It is not published as a commercial enterprise, but is the property of the largest organization of its kind in existence. Not a dollar of profit is taken by anyone, and **all receipts from advertising are reinvested in the publication itself, making it larger and better.** Advanced in circulation during last year 45 per cent, and we actually retain **95 per cent.**

You Speak Directly into 85,000 Homes of Unlimited Purchasing Power.

Fully 85 per cent of the people who read the Geographic are prominent business men, the greatest travel class in the country. For instance, our records show 1,500 Presidents and Vice-Presidents of Banks, 8,000 Engineers, 10,000 Physicians and Lawyers. It is read by every member of the family and regarded as the best magazine published—ask anyone who reads it.

A Limited Amount and Only the Highest Type of Advertising Accepted.

Our advertisers are a very satisfied lot, for they get that all-important requisite—results. There is nothing about our circulation figures to conceal; our mailing list in any city will be gladly shown, as well as a geographical distribution, and these statements are derived from an intimate knowledge of **this class who want the best and have the wherewithal to pay for it.**

Guaranteed edition, **85,000** monthly, advancing with each issue. Every copy subscribed for direct. No news-stand sale.

RATES.

One Page	$115.00
Half Page	57.50
Quarter Page	28.75
Eighth Page	14.38

Three full pages used during calendar year, $310.50 flat. Back cover in two colors and preferred positions on application.

DISCOUNTS.

12 Consecutive Insertions	10 per cent.
6 Consecutive Insertions	5 per cent.
3 Consecutive Insertions	3 per cent.

Size of page, eight-and-a-half by five-and-a-half inches. 224 lines. Date of publication, middle of current month. Copy and cuts should be in hand by fifth of preceding month.

Advertising Director, NATIONAL GEOGRAPHIC MAGAZINE,
Sixteenth and M Streets Northwest, Washington, D. C.

XUM

JUDD AND DETWEILER, Inc.

PRINTERS

We make a specialty of Legal Printing—Briefs, Records, and Motions

This Magazine is from Our Presses

Out-of-town Work Solicited
Two Phones

Booklets, Catalogues, and Best Grade of Commercial Printing

420-422 ELEVENTH ST., WASHINGTON, D. C.

THE

WASHINGTON LOAN AND TRUST COMPANY

WASHINGTON, D. C.

CAPITAL - - - -	$1,000,000.00
SURPLUS - - - -	$850,000.00

CHARTERED BY CONGRESS OF U. S. AND UNDER THE SUPERVISION OF THE COMPTROLLER OF THE CURRENCY

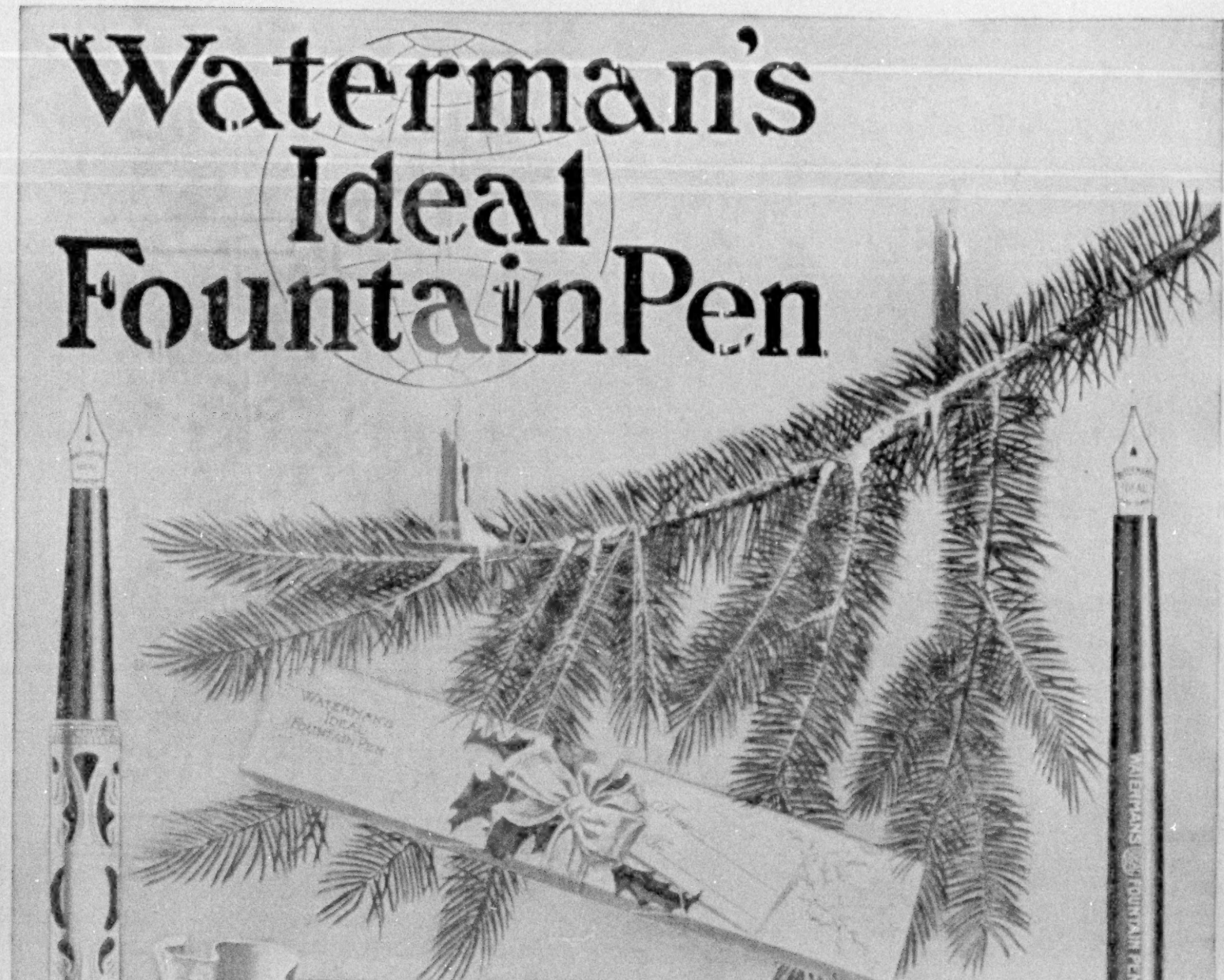
SOLICITS OUT OF TOWN ACCOUNTS AND PAYS INTEREST ON ALL DEPOSITS

ACTS AS EXECUTOR AND TRUSTEE UNDER WILL AND IN ALL FIDUCIARY CAPACITIES

BUYS AND SELLS FOREIGN EXCHANGE

JOHN JOY EDSON,
PRESIDENT

Waterman's Ideal Fountain Pen



Always Acceptable

Waterman's Ideal Fountain Pen is one of the very few gifts which the receiver can put right in his pocket for constant use. If everyone had the selecting of his own Christmas presents this is the kind that would be purchased. As a gift to **anyone** or for yourself there is not another article that shows better purchasing discretion than Waterman's Ideal Fountain Pen—it is a compliment to your taste.

This pen is made in a very wide range of sizes and styles in order that the pen technique of every writer may be individually suited. Your selection may be exchanged until satisfactory. Whether you buy a plain Waterman's Ideal or one studded with diamonds, the quality is of that same successful standard which the careful workmanship and Waterman patents have brought to continued perfection. This is the gift for people who are hard to suit. "It saves the dip."

Ask Your Dealer

STANDARD, SAFETY AND SELF-FILLING TYPES

Avoid Substitutes *Send for Gift Booklet*

Sterling Silver Filigree
No. 412 - $5.00
Larger Sizes
No. 414 - $7.00
No. 415 - 8.50
In Xmas Boxes
Clip-on-Cap adds 50c to above costs

Plain
No. 12 - $2.50
Larger Sizes
No. 14 - $4.00
No. 15 - 5.00
In Xmas Boxes
Clip-on-Cap adds 25c to above costs

L. E. Waterman Co. 173 Broadway, N.Y.
9 SCHOOL ST. BOSTON. 189 CLARK ST. CHICAGO. 734 MARKET ST. SAN FRANCISCO
L. E. WATERMAN COMPANY, LIMITED, MONTREAL.
KINGSWAY, LONDON. 9 RUE de HANOVRE, PARIS.